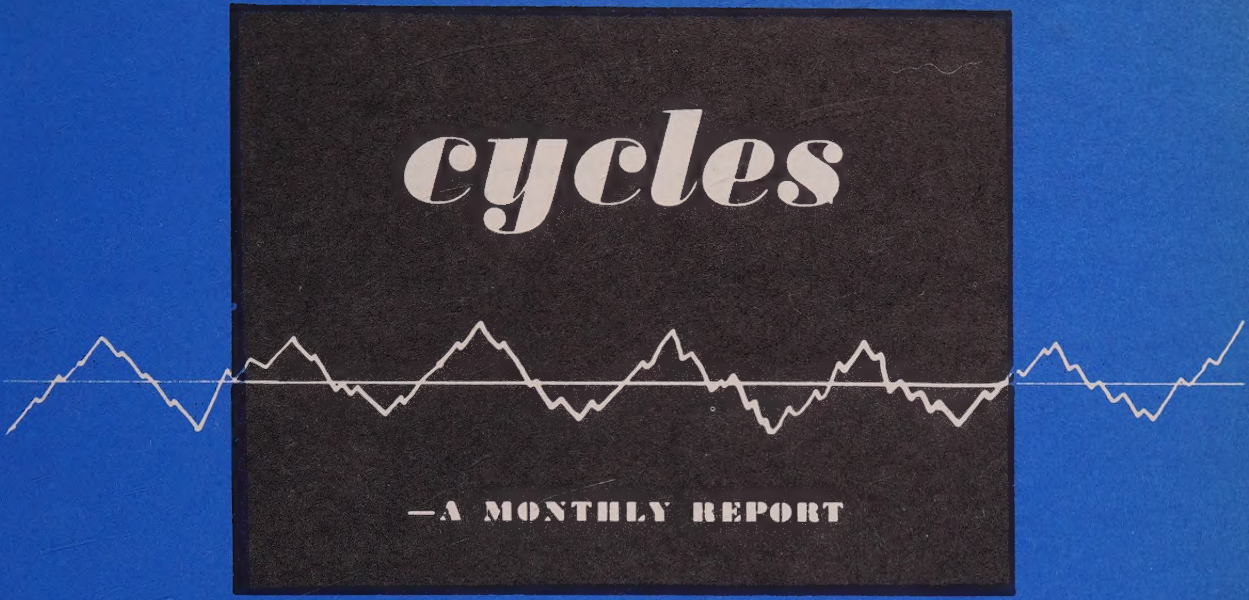

cycles

—A MONTHLY REPORT

May 1953

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

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cycles
—a monthly report

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VOLUME IV NUMBER 5 MAY 1953

The Director's Letter

Dear Member:

The other day we received the following letter from Mr. F. H. Getz of Lancaster, Pa.

Gentlemen:

I think your subject is a very interesting one but from your pamphlet I know less than I did before. For two dollars [*Some time ago we tried a $2.00 trial membership. This plan has now been discontinued.*] I received some mysterious tables that only a mathematician could understand. Maybe a mystic could do better. But I'm all up in the air. Would it not be better to send very simple explanations to laymen?

Few people can learn to swim by being thrown in.

I would like to know more about your studies but for $2.00 I received something that means nothing. I'm not complaining but I wonder if others have not experienced the same thing. Maybe you have a lot of big domes for other big domes who like pure research and sleep with slide rules but don't know how to talk to such as I am.

There was no explanation of how this thing works. Do I figure out the market, or do you? How do I get information on some particular stock?

Your department that handles prospects sure needs jacking up. I don't mind losing the two bucks but I hate like hell to miss out on a new subject as interesting as the study of cycles.

Now be a good sport and let me in at the beginning.

Thanks,

In reply I wrote as follows:

My dear Mr. Getz:

Letters such as yours are a real help.

I am not a big dome. I do not mean to write for big domes. But I guess I should plead guilty to the slide rule charge. And we who sleep with slide rules under our pillows sometimes forget that all the other people in the world are not equally peculiar!

Cycles are Simple

Cycles are the simplest thing in the world, at least in principle. Let me give you an example.

Suppose you are visiting my house and, looking out of the window, notice a bus pass by at 10:00 a.m. Half an hour later at 10:30 you notice another bus pass. At 11:00 you see another one. "Ah ha!" you say. "Buses here run every thirty minutes." You have discovered a cycle all by your little lonesome, without benefit of slide rule or gobbledegook. Cycles are just as simple as that (in principle).

Now what?

Well, first of all, you have a basis for predicting the probabilities of the future. If we go in to lunch and come out of the dining room at 1:05 you will know that you probably missed the 1:00 o'clock bus and that, *if the cycle is continuing*, your next bus will pass in 25 minutes. So you chat for about 20 minutes and leave at 1:25 so as to have to stand in the wind and the rain the least amount of time.

Of course the schedule may have changed, or the bus have been delayed by an accident. You can't count for sure on a bus at 1:30. You are merely playing *probabilities*.

Regularity Gives Predictability

Where you have regularity you have predictability—at least to the extent that the regularity governs, and is not present by chance.

Now let's do some more supposing.

You are overlooking a street near the center of a small town. Every ten minutes or so 10 or 15 people come along, more or less in a bunch. Another cycle! Again you can predict (with qualifications). More than this, with this regular result appearing before you, you have a right to assume a cause—if the time intervals have been regular enough and have repeated enough times so that the behavior cannot reasonably be the result of chance.

You don't know the cause but there is no law against guessing. So you guess that there is a bus station around the corner and that every ten minutes a bus comes in and discharges its passengers. If you then find out that there *is* a bus station, and that a bus does come in every ten minutes, your guess is bolstered. It is bolstered still more if you find that the buses arrive just about the time your bunches of people have been coming. But you still don't *know* that your people are coming from the buses. You would have to go out on the street and go around the corner to find out for sure.

Other Cycles

You continue to watch and count the people. You see other patterns. Every other ten-minute group of people is bigger. Perhaps there is a second bus with a twenty-minute schedule that reinforces the crowd from the first bus.

This is really the whole story about cycles.

You can predict that part of the traffic that comes in regularly recurring bunches. You can *not* predict by your 10- or 20-minute cycles the crowd of people that will come along when the feature of the local movie house is over. Your predictions are only *partial*. But they are good as far as they go *if* the cycles keep on coming true, and *if* you have timed them right. Moreover, by finding something else (in the example given, a bus schedule) with regularly recurring cycles of the same length you get a clue as to possible cause and effect and relationship. But to make sure, you need to run your clue down.

Almost everything fluctuates with rhythm—that is, in more or less regular cycles. Putting it another way, almost everything acts as if it were influenced by regularly alternating up and down forces which first speed it up and then slow it down.

Random Ups and Downs Too

Everybody would know this fact were it not for two things: First, in addition to the cycles there are accidental (random) fluctuations in things, too. These randoms hide the regularities so that at first glance you do not see them. Second, things act as if they were influenced simultaneously by several different rhythmic forces, the composite effect of which is not regular at all.

If we had several moons, the ups and downs of the tides would be very irregular. All the other moons would mix things up. It might have taken us much longer to find out about the tides.

Separating Cycles Easy

If you have a long enough series of figures with which to work it is not too hard to separate the different regular cycles from each other. When this has been done, you can project each regular cycle into the future. Then you can easily find out the combined or composite future effect of all the various cycles. When you have done this you have a preview of what is going to happen (a) *if the cycles continue*, and (b) *except as the cycles may be upset of distorted by accidental random noncyclic events*.

"Why wouldn't the cycles continue?" you may ask.

I'll give you one reason: The cycles

may have been present in the figures you have been studying merely by *chance*. The ups and downs you have noticed which come at more or less regular time intervals may have just happened to come that way. The regularity—the cycle—is there all right, but in such circumstances it has no significance. If you are zealous enough you can find regularity in almost anything, including random numbers where you know that the regularity has no significance and know it will not continue.

Many Repetitions Needed

How can you tell in any given instance whether or not the regularity you see is the result of a real underlying cyclic force which will continue to fluctuate regularly in the future?

The answer is, if the cycle has repeated *enough* times with *enough* regularity and with *enough* dominance, the chances are that it is the result of real cyclic forces.

Let me give you an example: Pick up a pack of playing cards and start to deal. The first card is red, the second is black, the third is red, the fourth is black. You have two waves of a regular cycle, red, black; red, black. But this sequence could easily come about by chance. You continue to deal: red, black; red, black. Four times in a row now, this regular alternation. It could still be chance, but it couldn't be chance very often. Continue to deal. Red, black; red, black; red, black. Seven times now! It could still be chance, but it is less and less likely. It begins to look as if somebody had stacked the cards. You go through the entire deck. Twenty-six times! "Somebody certainly stacked the deck," you say. "It couldn't happen this way by chance once in a million times."

Less and Less Likelihood of Chance

Exactly the same sort of reasoning applies to the cycles you see in the ups and downs of the stock market, or the sales of your own company, or the weather, or anything else in which you may be interested. The more the cycle has dominated, the more regular it is, *and the more times it has repeated,* the more likely it is to be the result of a real cyclic force that will continue. If it has not dominated enough, or has not been regular enough, you must have more repetitions to get equal assurance.

Well then, supposing that there are these rhythmic cycles in something. Suppose further that you have some knowledge of cycles. So what?

By using nothing more complicated than simple arithmetic you can find the cycles. By seeing how many times each cycle has repeated in the past you can have a pretty fair idea of its significance (i.e. whether or not it will continue). And by projecting all the significant cycles into the future you can get some light on what is ahead *insofar as the cycles govern.*

Cycle Forecast Like a Weather Forecast

In weather we are used to forecasts in terms of probabilities. "The probability for the Pittsburgh area is for snow." When you hear such a forecast on the radio you don't rush out to put on your chains. The weather man may be wrong. You wait for the snow to fall. *Then* you put on your chains. But the forecast warns you that snow is *likely*, and on the strength of this fact you do make sure that you have your chains with you. If you are to make use of cycles in your business or your stock market forecasting you are going to have to use the same approach. Moreover, just as you refrain from shooting the weather man when he is wrong, I hope you will refrain from shooting the cycle analyst too.

Cycles Indispensable

Cycles are not the whole answer, but on the other hand they are indispensable in attempting to arrive at the whole answer.

Cycles remind me of women. Women are not perfect (with individual exceptions, I hasten to add). But they are the best thing so far invented for the purpose. Until something better comes along we will have to make shift with them as they are—or else miss the values they have to offer. Let's find out all we can about them!

Cordially yours,

P.S.: You ask about outguessing the stock market.

I claim nothing except some limited and elementary knowledge of rhythmic fluctuation—those ups and downs in business, prices, war, stocks, weather, animal life, and hundreds of other behaviors which come at reasonably regular time intervals. I do not know any more than the next fellow, and maybe not as much, about the non-rhythmic accidental factors that have to be figured out also.

• • •

Important Policy Changes

As a result of important conferences held last week in New York four decisions have been made, as follows:

(1) To each future article in *Cycles—A Monthly Report* we plan to add a section to explain the significance of the discovery discussed. These sections will indicate the implications of the discovery in respect to "what's ahead." Up to now we have pretty much left you to do this for yourself. In the future I shall try to do it for you.

(2) Insofar as possible, we will, in the future, remove all technical material from *Cycles—A Monthly Report*, printing it in the *Journal of Cycle Research* instead.

That is to say, hereafter we plan to write *Cycles—A Monthly Report* for the man who is interested only in the discoveries made by others and in their practical implications for the future.

The man interested in techniques or who wishes to discover and isolate cycles in his own business or in the prices of securities and/or the commodities in which he is interested, will, from now on, turn to the *Journal of Cycle Research* for assistance.

(3) As an additional service to students of cycles, I plan to write a textbook of cycle analysis and to publish it serially in the *Journal of Cycle Research.*

(4) I plan to revise, rewrite, and bring up to date *Cycles—The Science of Prediction,* a book written in 1944 by Mr. E. F. Dakin and myself. This revision will be published in sections as supplements to *Cycles—A Monthly Report.* The first installment will appear next month in the June-July issue.

(5) We plan to hold a series of meetings in various parts of the country so that I can renew my acquaintance with our old members and meet as many as possible of our new members. If you want to help with a meeting of this sort in your city, please write to me at East Brady, Pa.

• • •

A New Research Plan

During January and February our membership showed a net gain of 409 persons. As of March 1st, membership stood at 1717.

Most of the money that came from the new members had to be used to pay for the advertising that told them about us. However, enough money is left over so that I think we can add to our reports a series of articles on short cycles in the stock market which, I believe, will be of practical as well as of scientific interest.

The *plan* is to make a study of one short-term cycle in the market—say a cycle about 3 months long—and report to you in regard to it in the *September* report, projecting it for you indefinitely into the future. Then to make a study of another short-term cycle--say one about 4 months long--and report to you on it, including of course a projection, in the *October* report. Also in the October report, if we are able by that time to pin down two short cycles, we would combine or synthesize them for you, and project the composite pattern. For the *November* report I will try to add and project a third cycle and all three in combination. In the *December* report I will try to add a fourth, and in the *January* report a fifth cycle. I hope this sounds to you like a worthwhile program.

• • •

A Sure Way to Make Money

Cycles are all right, but I still like Will Rogers advice best. Will said, you know, "The way to make money in the stock market is to buy good stocks. Hold them until they go up. Then sell them. And, if they don't go up; don't buy them!"

Cordially yours,

Edward R. Dewey

Director

Research

THE 9.3-YEAR CYCLE IN WHEAT PRICES

IN these days when grain prices are so much in the news it may be in point to see the cycles, if any, that are present in such prices. Let us start with an examination of the price of wheat.

Fig. 1 shows the average annual price of wheat from Civil War days to the present. At first glance no regularly recurring cycles are evident. Cycles are rarely seen by mere inspection.

There is, however, a rhythmic cycle about 9.3 years long in these figures. One reason you cannot see it is because some shorter cycles, present along with it, mix up the picture.

We can smooth out these shorter cycles by averaging the prices 5 years at a time. That is, we can average prices for 1866-70 and plot the result at 1868, average the prices for 1867-71 and plot the result at 1869, and so on for the entire series of figures. If we do this we get the curve in Fig. 2.

An averaging process of this sort will smooth out most of the various cycles less than 6 years long. Unfortunately it will also iron out about 1/2 of the 9.3-year cycle, but there will still be the other half left, and this is plenty to enable you to see it easily. I have diagrammed the 9.3-year cycle for you by means of a broken zigzag line.

The great peaks of 1918 and 1949 are not 9.3-year cycle peaks. They are war and/or inflation peaks which merely happen to be more or less pointed up by the 9.3-year cycle. If these distortions had happened to come a few years earlier or later their forces would have wiped out the 9.3-year cycle instead of adding to it. In fact, the Civil War appears to do just that, as you can see. Also, the current inflation kept prices going up for 4 years after the crop year 1945-46 when the 9.3-year cycle was due for a crest.

In order to get rid of at least some of this war distortion we should express the smoothed prices as percentages of a trend line which has no nine-year cycle in it.

Such a trend has been computed and is plotted as a broken line in Fig. 3. Percentages that the smoothed values are of the trend are shown in Fig. 4. The 9.3-year cycle can now be seen quite clearly.

This cycle in these figures has an overall strength or amplitude of 35% of trend and a length of 9.31 years, as closely as I can measure these two values with annual figures in a series of figures as short as this. I have called the length 9.3 years, but it could be 9 1/3 years just as easily as 9 3/10.

Troughs are due ideally half way between the crop years of 1875 and 1876 (as nearly as I can time the cycle with annual figures). As the crop year 1875 centers on Dec. 31, 1875, the ideal timing puts troughs at mid 1876 six months later. Other troughs come at 9.3-year intervals forward and backward from that time. Crests of the ideal cycle come 4.65 years after troughs. The last trough was due ideally in 1950. The next one is due in 1960. The intervening crest is due about the middle of 1955.

Do not get the idea that the price of wheat will necessarily go up to 1955 and then down until 1960. Nothing of the sort. Many other factors beside the 9.3-year cycle influence the price of wheat.

Think of it this way: Imagine some force which, in years of crest, makes wheat prices 17 1/2% more than they otherwise would be; which in years of trough makes wheat prices 17 1/2% lower than they otherwise would be; and which, in intervening years, has intermediate effects. That is to say: if this cycle is real (as I think it is), and continues (as I think it will), *and if everything else could be held just the way it is now,* (which is of course impossible), the price of wheat would go up about 7.9% a year until 1955, and then down in proportion to 1960.

"*What is this force?*" you ask. No one knows. That is one of the things we are trying to find out. But we have a right to assume a *cause* when we see an effect, do we not?

"How do you know we are seeing an *effect*? Perhaps this regularity is present by chance." You say. Perhaps it is, but we could not have eight waves as regular as these *easily* present by chance, and so we had best be on our guard lest they continue. That is, we had best take the continuation of behavior into account as a *probability*.

"If it does not give us the whole answer, what good is this information?" you ask.

Because, assuming the cycle is going to continue, you can not get the whole answer *without* it.

Moreover, some of the other ups and downs of wheat prices are cyclic too. Two more cycles have already been isolated. I plan to report on them during the next few months. These other cycles will modify the 9.3-year cycle, making some of its crests stronger—others weaker, some early, others late—and of course likewise for the troughs.

E.R.D.

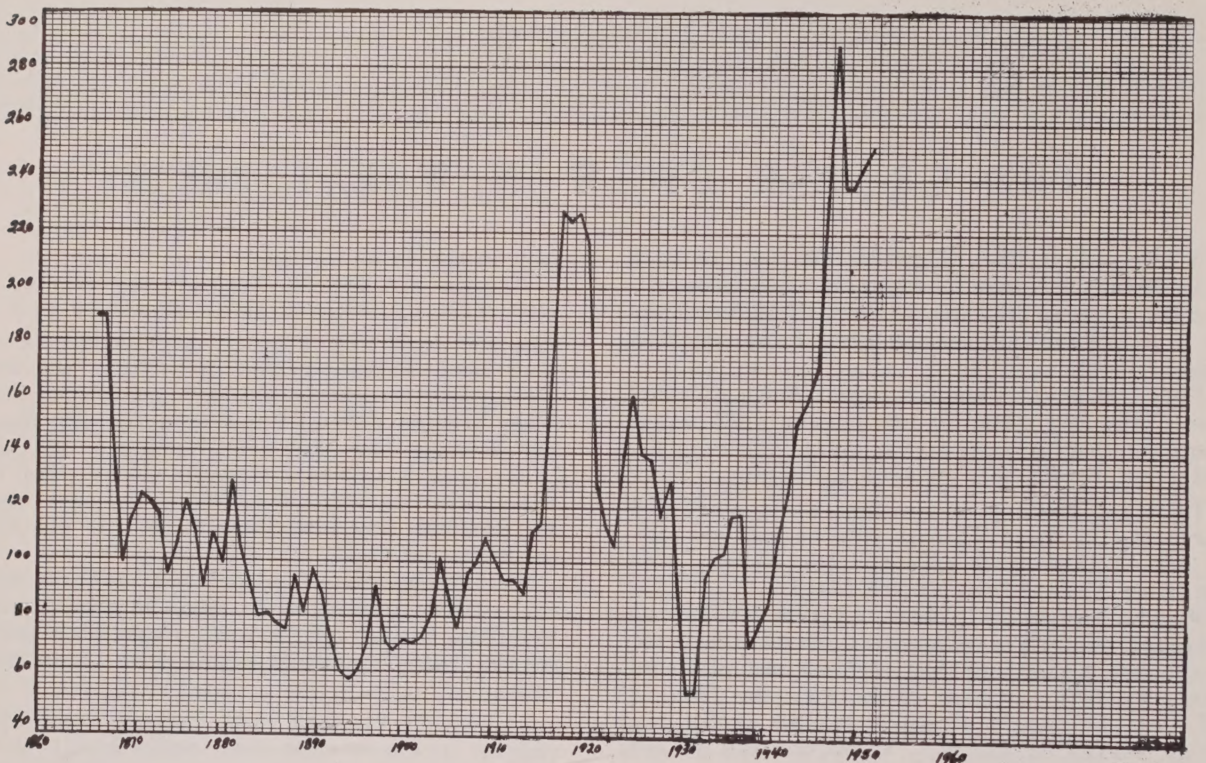


Fig. 1. Wheat Prices.
Average annual prices of wheat, crop years, 1866-67—1951-52

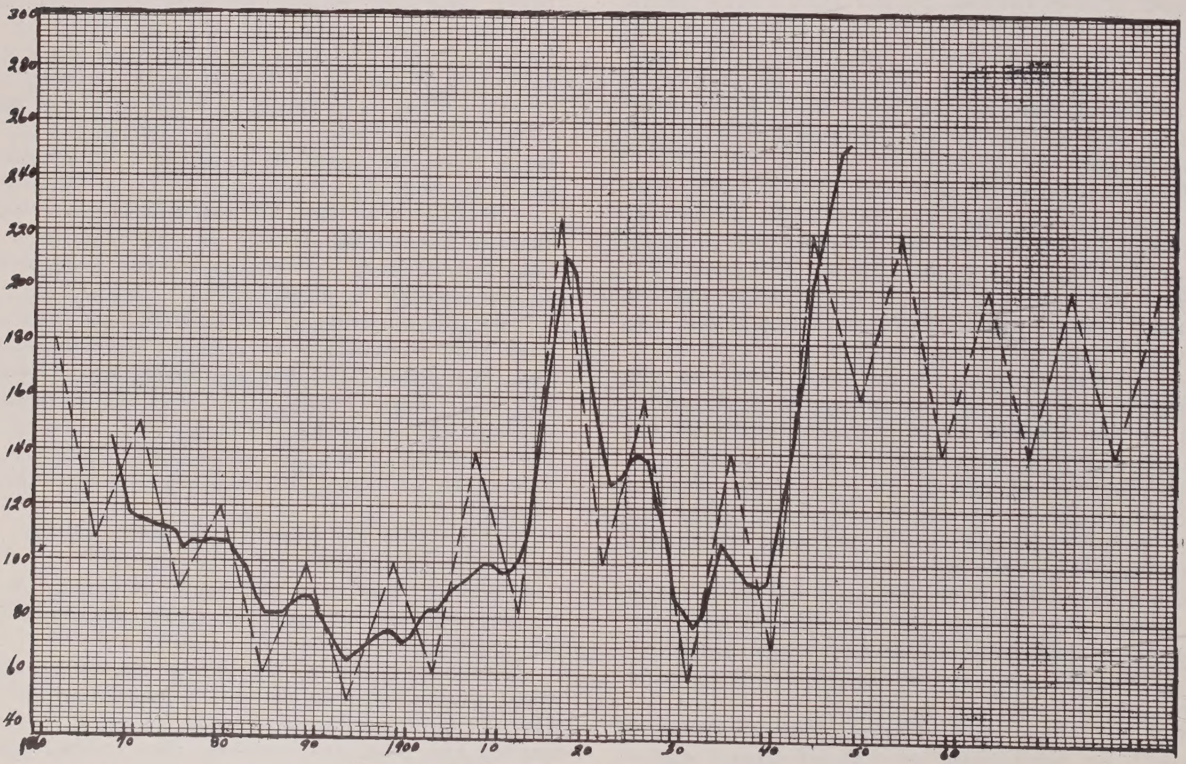


Fig. 2. Smoothed Wheat Prices and Diagram of 9.3-Year Cycle.
Average annual price of wheat, crop years, 1866-67—1951-52, smoothed by a 5-year moving average. (A 5-year moving average loses 2 years at each end of the series). A broken zigzag line has been added to diagram the 9.3-year cycle. The zigzag has been extended into the future to time the future up and down effect of this cycle, if it continues.

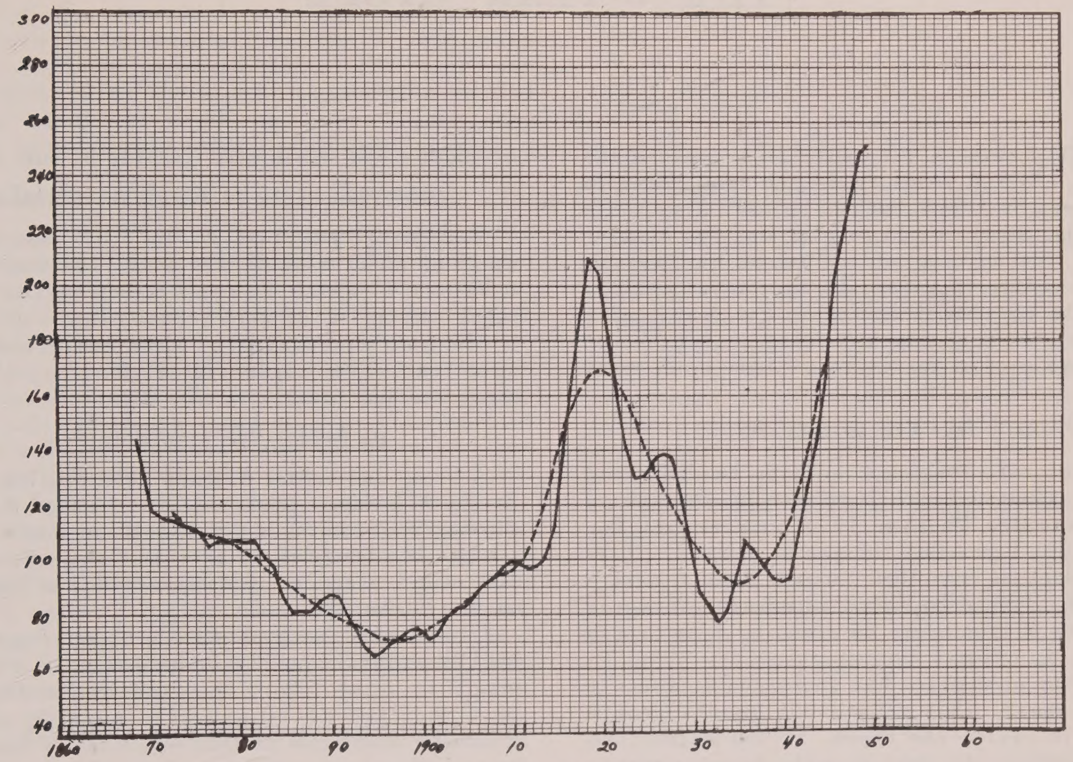


Fig. 3. Smoothed Wheat Prices and Trend.
Average annual price of wheat, crop years, 1866-67—1951-52, smoothed by a 5-year moving average (the values shown in Fig. 3) together with moving average trend. The trend is a 5-year moving average of a 9-year moving average. Such a trend loses 6 values at each end of the series of figures.

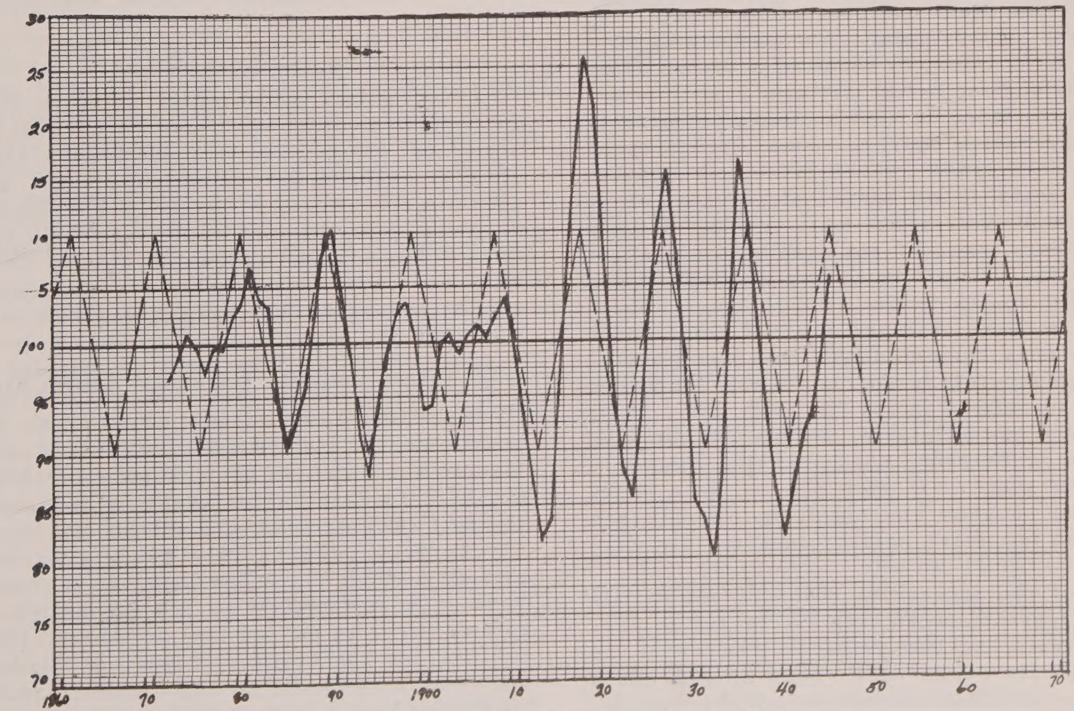


Fig. 4. Smoothed Wheat Prices as Percentage of Trend and Diagram of the 9.3-Year Cycle.

THE 8-YEAR CYCLE

MANY phenomena fluctuate in a cycle which is about 8 years in length from crest to crest or from trough to trough. This cycle in many phenomena is too regular and has continued over too long a period to be easily the result of chance. However, it is not yet certain whether the observed behavior is the result of a single cyclic force about 8-years in length, or two or more cyclic forces very close to 8 years long.

An 8-Year Economic Cycle

Many economic phenomena seem to be dominated by 8-year fluctuations. Cigarette production is a good example. On page 19 of our report for October 1950 I printed for you a chart of cigarette production from 1880 through 1949. A clear-cut rhythmic tendency, with intervals averaging about 8 years from crest to crest or from trough to trough, is evident by inspection.

Cigarette production has increased enormously over the years. This relatively smooth growth tendency is called the trend. If you adjust the actual figures for this growth characteristic you can see and study the 8-year cycle more easily. Adjusting for the effect of growth makes the cycle look more like a row of oil wells, less like a flight of steps.

In Fig. 1 trend is eliminated so that you can see the 8-year cycle undistorted by growth. The 8-year cycle is very clear. For purposes of comparison I have added, by means of a broken line, a perfectly regular 8-year pattern.

The growth trend we used is known technically as a 9-year moving average trend. Such a trend cannot be determined for the first four and the last four years of any series of figures, or at least cannot be determined until you have figures for four years more. If you wish to see a chart of the actual production before correction for trend, refer to the October 1950 report.

When I made my original study I had figures available only through 1947. The last point I could plot accurately on Fig. 1 was therefore the value for 1943. Figures for 1948, 1949, 1950, and 1951 are now available, and so the curve in Fig. 1 can be extended through 1947. The additional four years have been plotted in a heavy black line to show how the 8-year cycle has unfolded in the first half cycle after its discovery.

Study of the successive waves of the 8-year cycle in cigarette production as charted in Fig. 1 shows that, on the average, the cycle is almost exactly eight years long or perhaps a shade shorter. The last crest of the typical or ideal cycle would come ideally at mid 1952.

An 8-Year Cycle in Physical Phenomena

Barometric pressure at New York also shows a cycle of about eight years long (7.8 years to be more exact) which is reported upon for you on pages 145 to 146 of this report. This cycle needs no further discussion at this point except to note that, like cigarette production, its last crest was due ideally in mid-1952.

An 8-Year Cycle in Wildlife

A cycle just under 8 years long has been found in the abundance of lynx. Dr. Leonard W. Wing, who has been making a comprehensive cycle analysis of the abundance of lynx in Canada during the last two hundred twenty years finds a 7.95-year cycle in these figures.

This cycle is present in these figures in addition to the well known 9.6-year cycle in regard to which I have reported to you from time to time. That is to say, the records of lynx abundance fluctuate as they would do if they were being influenced simultaneously by one rhythmic force 9.6-years from crest to crest *and* by a second rhythmic force 7.95-years from crest to crest.

It is interesting that the ideal 7.95-year cycle in the abundance of lynx also crests in mid-1952.

Merely Coincidence?

I have given you examples of three rhythmic repetitive cycles, in three totally different sorts of phenomena, all of nearly the same length, as best we can measure them, and all coming with crests at exactly the same time, as nearly as we can determine the timing. Does this strike you as a little too much of a coincidence to be easily the result of random behavior? It strikes me that way, but just what the significance is I do not yet know.

The 8-Year Cycle in Industrial Common Stocks

Industrial common stock prices offer another example in the field of economics of a series of figures which act as if they were influenced by a cyclic force of about eight years from crest to crest or from trough to trough. In industrial stocks from 1871 to date the cycle seems to average about 8 1/6 years long, as nearly I have been able to measure it. In these prices the current crest is due ideally in June of 1954, two years after the crest in cigarette production. For details in regard to this cycle in industrial stocks refer to our report for January 1952, pages 5-8. For details in regard to earlier work on this cycle in stock prices back to 1854 refer to an article on pages 245-252 of the report for September 1951. By itself this cycle is not strong enough to trade on, but it is strong enough to modify the other cycles importantly.

The 8-Year Cycle in Other Phenomena

Many other cycles in the general neighborhood of 8 years are of record. Dinsmore Alter found a cycle of 8.1 years in sunspots numbers, and so did H. H. Clayton. Sir William Beveridge found a cycle of 8.05 years in length in three centuries of European wheat prices. In a study of a century of European weather David Brunt found an 8.16-year cycle. Douglass found an 8.2-year cycle in the alternate thickness and thinness of tree rings at Cibecue, Arizona (however, he did not seem to find it in tree rings generally). H. C. Moore found an 8-year cycle in both the weather and in the average yield of the chief crops in the central states, 1881 to 1921. L. W. Wing found a cycle of 8.05 years in length in the bag of European Partridge in Czechoslovakia, as well as the 7.95-year cycle in the abundance of Lynx, as mentioned above.

A Variety of 8-Year Cyclic Forces?

Are all these 8-year cyclic behaviors the result of one and the same cyclic force, measured with slight variations of accuracy in the various phenomena? Or, where they are reported as of different length, are they responses to different cyclic forces.

I am inclined to believe that we are observing responses to a variety of cyclic forces. I believe this because it seems unlikely that random variations could distort our measurements of cyclic forces by the amounts recorded, and because several of the mutiple harmonic analysis I have made suggest cycles of these various lengths present concurrently in the same series of figures, with one cycle or the other dominating.

Four Comprehensive Cycle Studies

The term *multiple harmonic analysis* refers to a manipulation of the data which indicates, with certain reservations, the more probable cycle lengths. Multiple harmonic analysis was fully described in our report for May 1952.

(a) In a multiple harmonic analysis of cotton prices which I made a number of years ago, a cycle of about 8 years in length was one of the strongest cycles revealed. In this 208 year series of figures the cycle showed itself to be slightly less than 8 years long. Two cycles were suggested; one about 7.8 years long and one about 7.95 years long, but the span of time over which figures of cotton prices are available is only a half long enough to effect a complete separation of these two cycles, if there are two.

(b) The multiple harmonic analysis of railroad stock prices 1831-1950 which I published for you in our April 1952 report, suggested a cycle 8.33 years long, another cycle 7.95 years long and yet another cycle 7.8 years long.

Such cycles could combine to look like 8 1/6 years over quite a long period of time.

(c) In the multiple harmonic analysis of pig iron prices 1784-1951 presented in our June 1952 report, a cycle 7.95 years long is indicated and also another cycle 8.15 years long.

(d) The multiple harmonic analysis of industrial common stock prices 1871-1950 printed in the May 1952 report shows very definitely a strong cycle about 8 years long, but does not provide enough readings to indicate whether the cycle is slightly over 8 years or slightly under 8 years, or both.

Summary

Cycles are suggested at about the following lengths:

	Length in Years						
	7.8	7.95	8.0	8.05	8.16	8.20	8.33
Railroad Stocks, U. S.	7.8	&7.95					&8.33
Cigarette Production, U. S.		7.95	&8.0				
Lynx Abundance, Canada		7.95					
Barometric Pressure, New York	7.8						
Pig Iron Production, U. S.		7.95			&8.15		
Industrial Common Stocks, U. S.		7.9			&8.16		
Wheat Prices, Great Britain				8.05			
Tree Rings, Arizona						8.2	
Weather, Europe					8.16		
Partridge Abundance, Czechoslovakia				8.05			
Weather, U. S. and Average Yield of Crops			about 8.0				
Sunspot Numbers			8.01				
Cotton Prices, U. S.	7.8	7.95					

What could cause behavior of this sort? Could it arise in the sun?

Eight-Year Solar Cycles

The simple harmonic analysis of sunspot numbers with alternate cycles reversed made in 1939 by C. N. Anderson showed definitely that there are at least two cycles in the general neighborhood of 8 years present on the average in this series. Anderson set these lengths at 7.8, 8.0, and 8.21 years with crests in 1949.15, 1952.3, and 1952.6 and with relative strength of 4.5, 2.4, and 2.6 respectively (see pages 147 to 149 of this report). There is however no assurance that Anderson has the lengths determined more than approximately. And there might be three or four cycles in this general neighborhood. Moreover the work has not yet been done so see if these solar cycles are rhythmic—that is, if they repeat time after time with a rhythm or beat. Finally, no one has explained how 8-year cycles in sunspot numbers—assuming they exist—could affect affairs here on earth.

Eight-Year Planetary Cycles

Proponents of the theory that cycle lengths "ought" to be harmonics of synodic periods of the planets could point out that in the neighborhood of 8 years there are nine such lengths as follows:

7.79 yrs.	1/22	synodic period	Uranus and Neptune
7.81 "	1/63	" "	Neptune and Pluto
7.94 "	1/62	" "	Neptune and Pluto
7.94 "	1/16	" "	Uranus and Pluto
8.07 "	1/61	" "	Neptune and Pluto
8.16 "	1/21	" "	Uranus and Neptune
8.20 "	1/60	" "	Neptune and Pluto
8.34 "	1/59	" "	Neptune and Pluto
8.36 "	1/4	" "	Saturn and Pluto

Too Soon to Spin Theories

However, as stated elsewhere, we just cannot measure cycles as long as 8 years in series of figures as short (relative to the length of the cycle) as 200 years to obtain the wave lengths with enough accuracy to say for sure that they do or do not conform to theoretical cycles which come as close together as do the lengths in the above table. It is true that the correspondences of wave length are rather dramatic, but they may be pure coincidence. At the present time we just do not know. Moreover, as with cycles in sunspots, no one has offered a convincing theory to explain how there could be any relationship even if we could know that the cycle lengths were identical.

What We Do Know

What we *do* know is that there is a tendency for many phenomena to fluctuate in cycles about 8 years long. The evidence suggests, but does not prove, the possibility of more than one causative cyclic force. There are many instances where a cycle of about 8 years in length has repeated itself so many times and so regularly that it cannot reasonably be the result of random forces. In these instances it should be taken into account in trying to forecast the future. As for the rest, some day we may find out.

E.R.D.

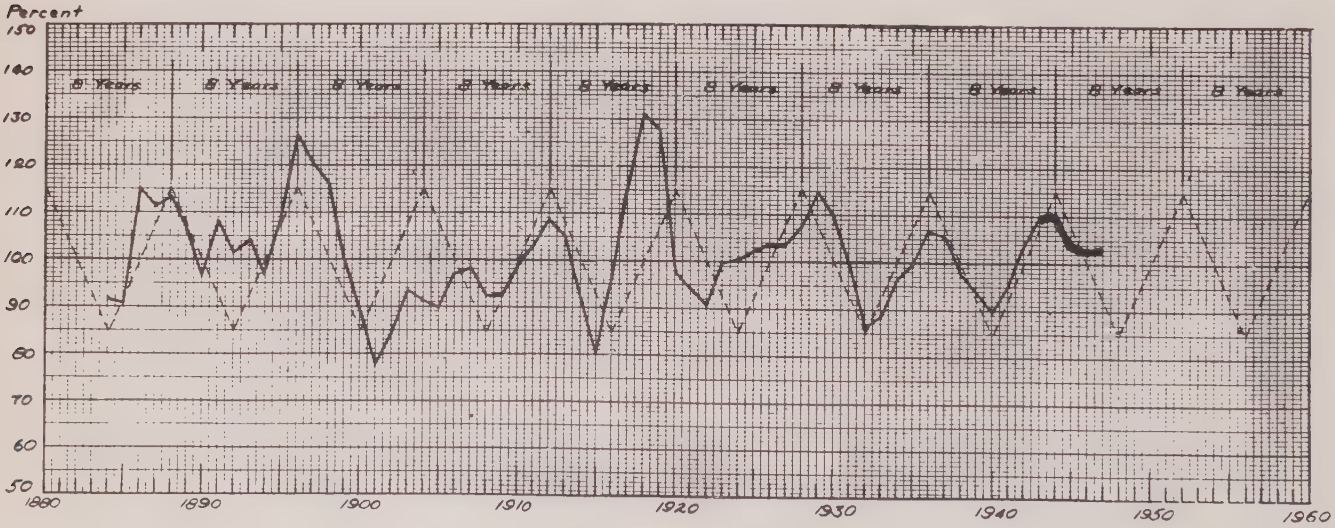


Figure 1.

Cigarette Production, 1880—1951,
After Adjustment for a 9-Year Moving Average Trend

A perfectly regular 8-year cycle has been added by means of a broken line. This cycle was first determined in 1948 with figures available through 1947. The last point which could be known at that time was the point for 1943 because the 9-year moving average trend loses four years at each end of the series.

The heavy black line, 1943 through 1947, shows how the cycle has unfolded during the four subsequent years.

Note that in 1952, we were exactly at the crest of another ideal 8-year cycle. Cigarette production is due to decline, relative to trend, for about four years.

CYCLES IN WEATHER

THE 8-YEAR CYCLE IN BAROMETRIC PRESSURE AT NEW YORK CITY

THERE is an eight-year cycle in barometric pressure at New York City, but you would never suspect it by glancing at Fig. 1, would you? Fig. 1 shows average annual pressures from 1872 through 1952. The actual data are given in Table 1 at the end of this story.

The chief reason you cannot see the eight-year cycle easily is because it is obscured by a lot of little cycles and accidental variations. These can be removed by "smoothing" the curve in Fig. 1.

For our purposes the best way to smooth out the short-term fluctuations is to average the pressure for years 1872—74 and plot the resulting average at 1873, then to average the pressure for years 1873—75 and plot the resulting average at year 1874. We continue the process for all the values up to the years 1949—51, the average pressure of which is plotted at 1950. Such a moving average, as it is called, is plotted in Fig. 2.

The eight-year cycle is now clearly evident. It has been diagrammed by means of a broken zigzag line.

In a series of figures as short as this, relative to the length of the cycle, you cannot find the length of the cycle exactly. You should, however, be able to get the length correct to the nearest 1/10 year. Having done the necsssary work we find that the length is probably about 7.8 years.

Troughs of the ideal or typical 7.8-year cycle come at about the beginning of 1925 and at 7.8-year intervals forward and backward from that time. Crests come four years later. The current crest of the ideal cycle was due at about 1952.4; that is, about the middle of 1952. The rhythm is too regular and has continued over too long a time to be easily the result of chance. You can take it as a reasonable probability, therefore, that average barometric pressure at New York will decline irregularly until the general neighborhood of 1956.

So what?

For my part, I do not care a whit whether barometric pressure at New York is going to go up or go down, but I am greatly impressed by the fact that a cycle present in economic affairs as importantly as the eight-year cycle is present proves to be present in natural phenomena as well. Cigarette consumption cannot affect barometric pressure—but perhaps variations of barometric pressure could affect the demand for cigarettes. Of course, I am using cigarette production merely as an example. The eight-year cycle is present in the stock market and in dozens of other series of economic figures. Do changes in barometric pressure first stimulate and excite and then retard and depress us human beings and the various animals that respond to the eight-year cyclic force? If so, how do such changes operate? Why does barometric pressure behave this way? What lies *behind* variations of barometric pressure? Could it be that whatever makes barometric pressure go up and down in an eight-year cycle affects human beings *directly*?

Does barometric pressure at places other than New York have an eight-year cycle, too? Is the behavior world wide? As the amount of air is fixed one would imagine that an eight-year cycle in pressure in one part of the world would have to be offset by an *upside down* eight-year cycle in pressure in some other part of the world. Is there such an upside down eight-year cycle and, if so, where? Also, in these other parts of the world, do economic affairs have an upside down eight-year cycle, too? No one knows, but it is extremely important to find out if we are to understand the rhythmmc forces to which we, as human beings, are subject.

E.R.D.

TABLE I
BAROMETRIC PRESSURE AT NEW YORK, 1873-1952
(EXPRESSED AS EXCESS OVER 29.000 INCHES)

YEAR	PRESSURE	YEAR	PRESSURE	YEAR	PRESSURE	YEAR	PRESSURE	YEAR	PRESSURE
1873	.685	1889	.678	1905	.698	1921	.709	1937	.689
1874	.729	1890	.694	1906	.711	1922	.722	1938	.700
1875	.694	1891	.703	1907	.678	1923	.691	1939	.663
1876	.641	1892	.683	1908	.700	1924	.682	1940	.669
1877	.683	1893	.677	1909	.663	1925	.686	1941	.662
1878	.642	1894	.704	1910	.663	1926	.650	1942	.660
1879	.716	1895	.676	1911	.722	1927	.699	1943	.679
1880	.726	1896	.702	1912	.681	1928	.673	1944	.686
1881	.688	1897	.701	1913	.708	1929	.685	1945	.672
1882	.720	1898	.692	1914	.706	1930	.687	1946	.713
1883	.737	1899	.709	1915	.670	1931	.666	1947	.648
1884	.699	1900	.681	1916	.680	1932	.665	1948	.716
1885	.666	1901	.646	1917	.684	1933	.655	1949	.73
1886	.694	1902	.655	1918	.690	1934	.709	1950	.70
1887	.697	1903	.689	1919	.703	1935	.696	1951	.68
1888	.691	1904	.705	1920	.676	1936	.686	1952	.66

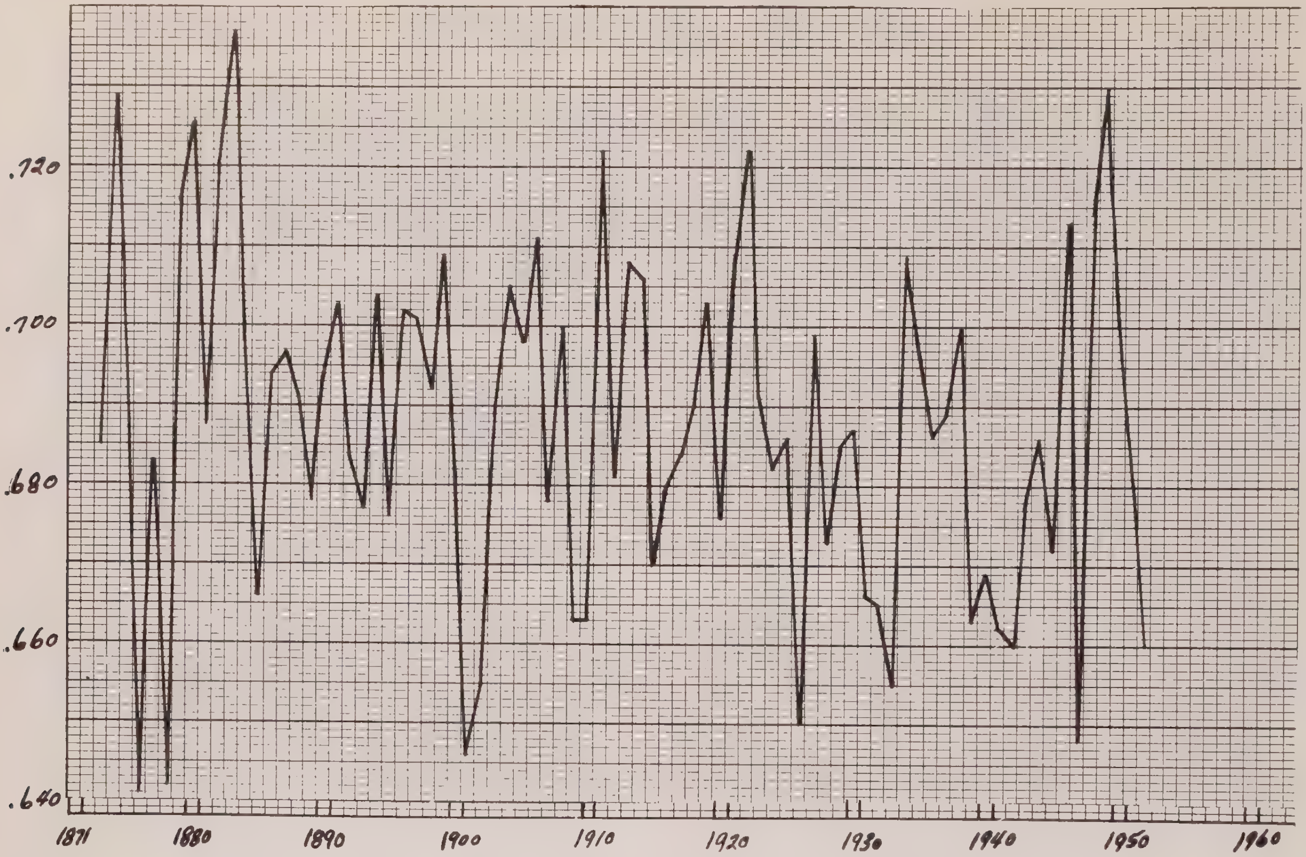


Fig. 1. Average annual barometric pressure at New York City, 1872-1952.

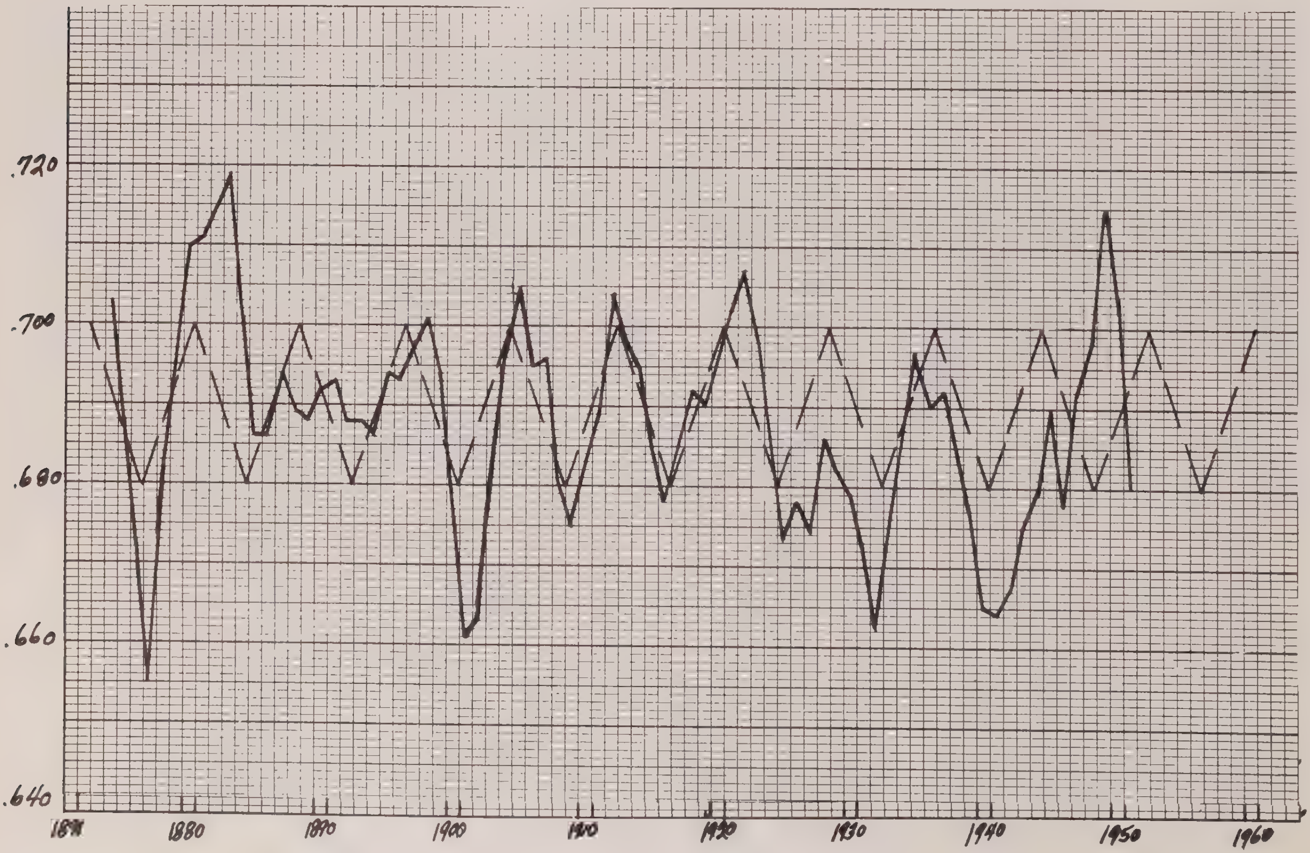


Fig. 2. Three year moving average of barometric pressure at New York City, 1872-1952, smoothed by a 3-year moving average. There are no plottings for 1872 or 1952 because a three year moving average loses a year at each end of the series. A perfectly regular 7.8-year cycle has been added by means of a broken zigzag line.

C. N. ANDERSON'S SUNSPOT CYCLES

A FEW years ago an engineer named Anderson made an important study of sunspot numbers. It took him and his assistant two years to do the job.

Anderson works for the Bell Telephone Laboratories. Sunspots are important to that company because lots of sunspots mean trouble on the transatlantic telephone lines.

Astronomers have been counting the number of spots on the sun for two hundred years or more. The average number observed in each month has been recorded from 1749 to date. A chart of these numbers is shown on page 149 on Fig. 1. As you can see, the number of spots increases and decreases in a rhythmic cycle which averages a little over 11 years long. Why, nobody yet knows.

What Are Sunspots?

Sunspots are areas on the surface of the sun which are cooler than the surrounding surface and which therefore appear darker.

Sunspots are magnetic. The spots act as if they were the positive (north) and the negative (south) poles of huge horseshoe magnets located inside the sun.

Sunspots usually come in pairs. Mostly, in the northern half of the sun, in any one cycle, the leading spot will show the same sort of magnetism. In the southern half of the sun, in that cycle, the spots with the other sort of magnetism will lead. Next cycle the situation is reversed. If north pole or positive spots lead in the northern half of the sun this cycle, the next cycle in the northern half of the sun south pole or negative spots will lead.

Anderson's Stroke of Genius

Anderson reasoned, "If the polarity of every other sunspot cycle is reversed why not chart every other sunspot cycle upside down? That is, why not chart spots for one cycle above the zero line (in the usual way) and spots for the next cycle *below* the zero line (upside down from the usual way)?"

No sooner said than done. The result is shown in Fig. 2. We get a cycle about 22 years long fluctuating about the zero line as an axis.

It has always seemed to me that this brainstorm of Anderson's was a stroke of genius.

Having turned every other cycle upside down as explained above, Anderson then began his cycle study. What looked at first glance to be a simple 22-year cycle turned out to be a whole complex of cycles. That is, the number of spots increased and decreased as they would do if they were influenced by many different cyclic forces, all acting together.

In studying this series of sunspot numbers with every other cycle upside down Anderson noticed that many of the cycles he found were close to unit fractions of 312 years. This fact led him to assume that *all* cycles in sunspots with every other cycle upside down *might be* unit fractions of 312 years.

Cycles on the Earth

Many of the lengths which Anderson found or used are very close to lengths of cycles that have been found on earth. This fact suggests Anderson may have been on the right track and also that the cycles on the sun and on earth may be related. On the other hand, a projection of his cycles has not worked out too well in forecasting sunspot numbers. This fact suggests that cycles in sunspot numbers (with every other cycle upside down) probably do not, at least in all cases, have lengths or periods which are exact unit fractions of 312 years.

We printed an account of Anderson's work for you as Foundation Reprint No. 19. But that reprint did not give you the strength or timing of the various average cycles. These facts are now being printed for the first time in Table 1 on the next page.

Unit Fractions

A *unit fraction* is a fraction the upper part or numerator of which is 1 and the lower part or denominator of which is a whole number. For example, 1/2, 1/3, 1/4, 1/5, 1/6, etc. are unit fractions. Unit fractions are often called harmonics. The unit fraction 1/2 is called the second harmonic. The unit fraction 1/3 is called the third harmonic, and so on. The base length of which the other lengths are fractions is called the fundamental.

Working on this assumption Anderson then found the timing and relative strength of the average cycle of each of the unit fractions of 312 years down to the 1/58th. The 58th harmonic of 312 years has length of 5.4 years.

Let me explain this a little. Anderson did not in all cases do the work to find out if there really is a *rhythmic* (repetitive) cycle for each unit fraction of 312 years which has repeated time after time. In many instances he just chopped his string of figures into halves, thirds, fourths, fifths, etc. down to 58ths and averaged the two halves, the three thirds, the four fourths, etc. This gave him strength and timing of a cycle of each of these lengths *if a cycle of this length happened to be present.*

Table 1

Sunspot Numbers With Alternate Cycles Reversed
Strength and Timing of Arbitrary Cycles
Harmonics of 312 Years
Epoch is Taken as the Beginning of the Positive Portion of the Cycle

Unit Fractions	Period in Years	Strength (Amplitude)	Epoch Starting Date	Current Crest
1/1	312	5.0	1834.0	1912.00
1/2	156	4.0	1838.5	1877.50
1/3	104	4.0	1823.0	1953.00
1/4	78	1.4	1810.0	1985.50
1/5	62.4	4.8	1795.5	1935.90
1/6	52	3.0	1763.5	1932.5
1/7	44.6	6.5	1754.5	1943.90
1/8	39	2.5	1769.5	1935.25
1/9	34.7	8.0	1758.5	1940.49
1/10	31.2	6.4	1767.3	1962.30
1/11	28.4	3.2	1758.8	1964.43
1/12	26	7.0	1768.0	1956.5
1/13	24	14.0	1768.6	1942.60
1/14	22.28	65.0	1755.2	1961.29
1/15	20.8	8.4	1752.8	1945.20
1/16	19.5	9.0	1753.8	1953.67
1/17	18.35	18.0	1755.0	1961.43
1/18	17.33	17.6	1757.3	1952.29
1/19	16.42	5.0	1757.3	1958.45
1/20	15.6	3.2	1762.5	1953.60
1/21	14.8	8.0	1749.0	1945.85
1/22	14.2	8.0	1746.3	1948.39
1/23	13.6	4.0	1746.5	1953.36
1/24	13	8.0	1750.5	1948.70
1/25	12.5	5.0	1752.0	1954.8
1/26	12	2.1	1757.5	1952.5
1/27	11.55	1.8	1751.5	1950.83
1/28	11.15	1.5	1755.0	1958.35
1/29	10.8	1.0	—	—
1/30	10.4	.9	1758.0	1958.20
1/31	10.1	2.5	1758.7	1952.43
1/32	9.8	4.0	1751.0	1948.43
1/33	9.45	3.4	1754.8	1955.70
1/34	9.2	2.8	1753.5	1957.53
1/35	8.95	1.0	1749.0	1956.25
1/36	8.7	1.5	1750.2	1951.69
1/37	8.45	1.1	1751.5	1955.98
1/38	8.2	2.6	1753.5	1952.60
1/39	8	2.4	1750.3	1952.30
1/40	7.8	4.5	1752.2	1956.95
1/41	7.6	4.3	1754.8	1954.55
1/42	7.4	5.0	1751.0	1953.42
1/43	7.25	1.5	—	—
1/44	7.1	1.8	1755.5	1955.81
1/45	6.9	4.0	1749.6	1952.39
1/46	6.8	1.0	1750.3	1955.47
1/47	6.6	2.0	1750.3	1951.10
1/48	6.5	1.5	1751.0	1954.12
1/49	6.38	3.5	1751.0	1956.35
1/50	6.24	1.5	1752.7	1953.94
1/51	6.12	3.4	1752.5	1955.91
1/52	6	2.3	1753.3	1953.00
1/53	5.9	1.0	1754.0	1955.61
1/54	5.8	2.0	1754.2	1952.08
1/55	5.7	2.4	1754.5	1954.46
1/56	5.6	.5	1753.5	1955.46
1/57	5.5	2.0	1750.1	1953.99
1/58	5.4	1.0	—	—

Explanation

The first column of Table 1 names the unit fraction of 312 years. The second column tells you how long this unit fraction is. The third column gives you the relative strength of a cycle of that length. The fourth column gives you the date of the start of the positive portion of an average cycle of the given length. The fifth column gives you the date of the current crest. Thus in the table the third line reading *3, 104, 4, 1823, 1953* means that the 3rd harmonic (1/3 of 312 years) is 104 years long; that if you average all the data in 104-year sections the average cycle obtained has a relative strength of 4; that one positive portion begins at 1823, and that the current crest of an average cycle of this strength is due in 1953. (The crest comes 1/4 of a cycle length after the start of the positive portion of the cycle. Other crests come at cycle lengths forward and backward from that time.

Two Points of Importance

I want to stress two points:

The cycle lengths given in Table 1 do not, except in some instances, represent real repetitive rhythmic cycles found by Anderson. For the most part they represent only theoretical cycle lengths. These cycle lengths are real only if Anderson's theory is true—and apparently his theory is not exactly true.

On the other hand, many of the cycle lengths given in Anderson's table correspond so closely to observed terrestrial cycle lengths (and so closely in timing as well) that the whole subject of cycles in sunspot numbers with every other cycle upside down demands much more attention than it has had in the past. What is needed is a *multiple* harmonic analysis of these numbers. Such an analysis would suggest the *true* cycle lengths. Following this we need a *complete* cycle analysis to find out, as well as possible, if these suggested cycles are truly rhythmic and repetitive.

E.R.D.

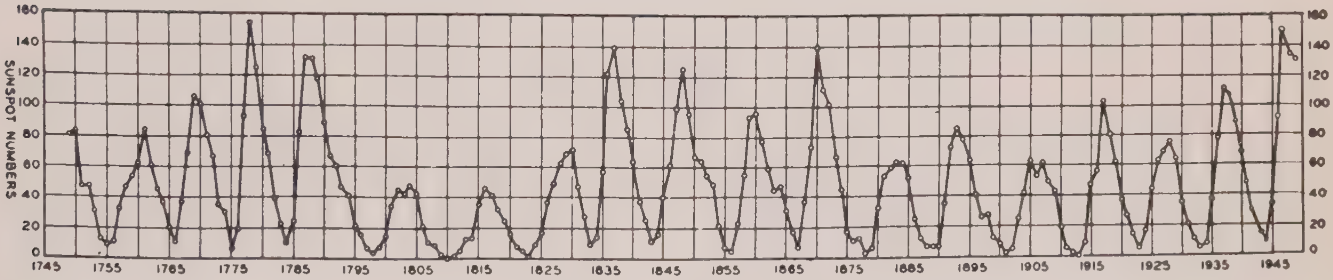


Fig. 1. Yearly Averages of Monthly Relative Sunspot Numbers. 1749-1949
(After Anderson)

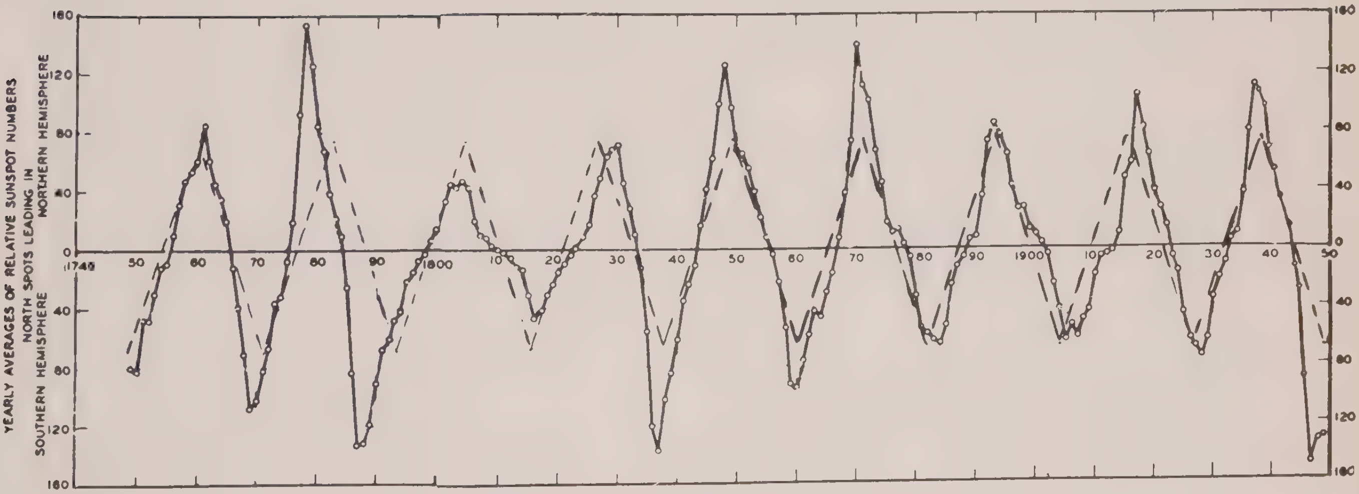


Fig. 2. Yearly Averages of Monthly Relative Sunspot Numbers. 1749-1949,
Alternate Cycles Reversed (After Anderson) Broken Line Added to
Diagram the 22 1/5-Year Rhythm.

How it Came Out

THE 9-YEAR CYCLE IN PRESBYTERIAN CHURCH MEMBERSHIP

THE lead article in our monthly report for June 1950 told you of a 9-year cycle in new members in the Presbyterian Church in the U.S.A. (Northern) from 1826 through 1948—the latest figures, then available.

A chart of the actual figures, smoothed by a three-year moving average, and with arrows at 9-year intervals to indicate the ideal timing of the 9-year crests was printed as Fig. 2. A high for 1949 was indicated.

The last point plotted in Fig. 2 was for 1947, because a 3-year moving average loses a value at each end of the series.

In our report for September 1952 I added points for 1948 and 1949 to the curve, raw data for 1949 and 1950 having become available.

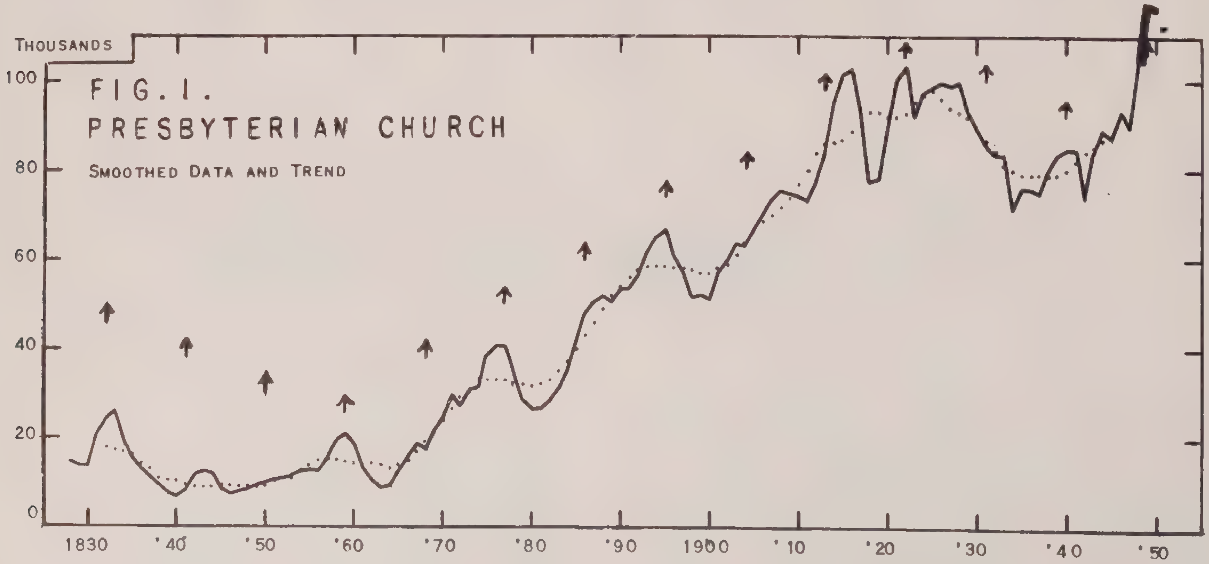
Figures for 1951 have now been released. A third average (for 1950) can now be added. The curve is bending over. A decline has started. The year 1949 *was* a year of high.

If the decline continues the peak will have come exactly on time. This of course will be beginner's luck. Reference to the chart shows that, in the past, peaks have often come as much as two years one way or the other from perfect timing. However, the 9-year cycle is these figures is regular enough and has repeated often enough so that it should definitely be taken into account in trying to forecast the future of these figures.

From 1940 the trend of new membership has been sharply upward. The downward force of the 9-year cycle may not be enough to overcome this trend. During the period 1949-1954 the 9-year cycle may act mainly to snub or retard growth. In any event, after 1954 the probabilities favor a relative upturn in the curve of new members.

It might be well to explain a little more clearly just what the points on the curve represent. The point plotted for 1948, for example, represents the average number of new members received through profession and reaffirmation of faith for the three years 1947, 1948, and 1949 (108,115). The point plotted for 1949 represents the average of similar figures for 1948, 1949, and 1950 (116,866). The point plotted for 1950 is the average for 1949, 1950, and 1951 (116,640). The value for 1951 by itself is 112,084. This value is shown by a point.

E.R.D.



THIS CHART SHOWS NEW MEMBERS OF THE PRESBYTERIAN CHURCH IN THE U.S.A. (NORTHERN) 1826-1951, SMOOTHED BY A THREE-YEAR MOVING AVERAGE. THE ARROWS SHOW IDEAL TIMING OF THE 9-YEAR CYCLE WHICH CAN BE SEEN BY INSPECTION. THE LIGHT LINE SHOWS THE VALUES ORIGINALLY PRINTED IN OUR REPORT FOR JUNE 1950; THE HEAVY LINE SHOWS THE VALUES FOR THREE ADDITIONAL YEARS. THE LAST POINT ON THE CURVE IS FOR 1950, AS THE LAST FIGURES NOW AVAILABLE ARE FOR 1951 AND THE MOVING AVERAGE LOSES ONE YEAR AT EACH END OF THE SERIES.

THE HEAVY LINE SHOWS THAT NEW MEMBERSHIP INCREASED IN ACCORDANCE WITH EXPECTATIONS, AS PRINTED THREE YEARS AGO. A CREST MAY HAVE BEEN REACHED IN 1949. IF SO, IT CAME EXACTLY ON TIME.

Questions & Answers

Question:

(1) What is harmonic analysis?

(2) How is an harmonic analysis made?

(3) What does the result of an harmonic analysis mean?

(4) Is it necessary to make a harmonic analysis to have a thorough cycle analysis?

Answer:

(1) Harmonic analysis is a method of breaking a curve down into a set of periodicities of arbitrary length and shape. (A periodicity is a cycle which repeats with perfect regularity.)

The arbitrary lengths are 1/2, 1/3, 1/4, 1/5 and all other unit fractions of the length of the original curve. The arbitrary shape is sine shape—the shape of wave you would get if you traced the path of a pendulum swinging over a piece of paper moving at a constant rate at right angles to the direction in which the pendulum was swinging.

These arbitrary periodicities are to be thought of as mathematical building blocks, unrelated to reality. That is, if there are real cycles of their length and shape it is purely by accident.

When these periodicities are recombined they reproduce the curve with which you started.

As the periodicities are arbitrary, a projection of them into the future, either singly or in combination, has *no* value for forecasting purposes.

On the other hand, if any of the arbitrary periodicities have exceptional strength (amplitude), a real cycle at or near the indicated length is suggested as a possibility.

(2) The best way, all things considered, is to make your harmonic analysis by tracing the curve successively with the stylus of a harmonic analyzer—a machine that can be bought for about $12,000. The analysis can be made by electrical and optical devices, but those I know about are not accurate enough to be practical.

If you have no machine around the house, make a succession of periodic tables, one for each unit fraction of the length of the curve, and fit a sine curve to the cycle obtained by averaging each column of the periodic table. Clear? Perhaps not, but see answer to next question.

(3) The result of a harmonic analysis means almost nothing for the cycle student. It does not tell you the length, timing, or strength of the real cycles that are present, It is therefore not too important to know about.

(4) It is *not* necessary to make a harmonic analysis to have a thorough cycle analysis. It is not even desirable.

But, if you make at least ten complete harmonic analyses (twenty are better) of your curve and successively shortened sections of it, you will get hints of actual cycles that may be present. Such a manipulation of figures is of value. It is called *multiple harmonic analysis*. Mathematically speaking it is a bastard method, but it works.

Question:

At times harmonic analysis is mentioned in such a manner that a reader would assume you are giving considerable weight to it in your thinking. At other times you caution that it is not wise to place too great a value on harmonic analysis as such. Is there any criteria to use in deciding just what weight should be given the result of harmonic analysis?

Answer:

You should distinguish between *harmonic analysis* as such, which is almost useless for cycle students, and *multiple harmonic analysis*, a little invention of my own, which is of great help for *preliminary* reconnaissance. But even multiple harmonic analysis will give no more than hints of cycles which may be present.

Take for example a series of figures 600 months long. Ordinary harmonic analysis says: If there is a cycle 300 months long (1/2 of 600 months) in these figures its strength is so and so. If there is a cycle 200 months long (1/3 of 600 months) its strength is such and such. If there is a cycle 150 months long (1/4 of 600 months) its strength is such and such. And so on for successive unit fractions for as far as you wish to go. But there is not one chance in a hundred there *is* a cycle at any of these arbitrary lengths.

Multiple harmonic analysis, on the other hand, gives you the strength of ten or twenty times as many possible cycle lengths and tells you directly which are the more likely to be the result of real cycles.

Ordinary harmonic analysis is like shooting at black cats at night with an ordinary rifle. A hit is unlikely, and if you do happen to hit you would have no way of knowing.

Multiple harmonic analysis is like shooting at bells at night with a machine gun. You are still blind, but you shoot twenty times the bullets, stand twenty times the chance of a hit, and can tell by the sound when you hit something.

Question:

Isn't it true that in a series of figures such as price data, that there are probably an unlimited number of cycles, running if the data were long enough into milleniums in length, and if we had the accurate methods to find out and again the data to work with, down to the very minutes of the day?

Answer:

I do not have the remotest idea. Your guess is as good as mine.

Question:

Sometimes you speak of "raw figures." What do you mean?

Answer:

Raw figures refers to figures before they have been manipulated or adjusted in any way.

To see the cycles more clearly you often have to adjust for the effect of long term growth, or "smooth out" shorter cycles and random fluctuations, or otherwise modify the original figures. The original figures, before any of these modifications, adjustments, or manipulations, are spoken of as being *raw.*

Question:

What is a *median*?

Answer:

Median means middle. The median value is the middle value when the numbers are arranged according to size. If three boys weight 90, 100, and 170 pounds respectively, the median or middle weight is 100 lbs. (The *arithmetic average* is $\frac{90 + 100 + 170}{3}$ or 120 lbs).

When you have an even number of values, you have to compute the median by averaging the two middle values when the numbers are arranged by size. For example, if you have four boys weighing 90, 100, 120, and 170 pounds respectively their *median* weight is 110 lbs. $\frac{(100 + 120)}{2}$. The *average* weight (arithmetic average) is still 120 lbs— $\frac{(90 + 100 + 120 + 170)}{4}$.

Question:

Suppose you have a "reversing" cycle of say 14.36 months, how do you go about finding the cycle lengths contributing to this false cycle?

Answer:

A reversing cycle is known by the fact that it fades out as we go forward and backward in time; as we go still further forward and backward it comes in again, only upside down. That is, you find tops where a projection of the cycle would call for bottoms, and vice versa.

To find the length of the component cycles which have blended to make the false cycle proceed as follows.

(1) Find the number of waves of the false cycle between the two times when the cycle has faded out. Suppose with your 14.36-month cycle you have 20 1/2 such waves between vanishing points. Multiply wave length (14.36 months) by number of waves to get number of months elapsed time. This gives us 294.38 (20 1/2 x 14.36 = 294.38). This is the synodic period of the two component waves.

(2) Multiply this synodic period by 2. In the example given we get 588.76 (294.38 x 2 = 588.76).

(3) Multiply the number of false cycles in the synodic period by 2. In the example given we have 20 1/2 wave; 20 1/2 x 2 = 41.

(4) Divide the double synodic period by one more than the value given by step 3, and by one less.

That is, in the example given divide 588.76 by 41 plus 1 or 42 and by 41 minus 1 or 40.

The answers, 14.018 and 14.719 respectively, are the lengths of the cycles which have blended to make the false reversing length of 14.36 months *if* (a) you have the length of 14.36 correctly determined; (b) the synodic period has been correctly determined at 20 1/2 of these 14.36-month cycles; (c) the original 14.36-month cycle really was a reversing cycle to start with, and (d) the strengths of the two component cycles are approximately equal.

Question:

Tch! tch! On pages 237 and 238 of the Report for September 1952 are two charts. The horizontal scales are labeled months. On page 236 the text gives the lengths in years. Is it years or months?

Answer:

Years!

So I made a mistake
. . . shoot me!

Foundation Affairs

COLLEGE LIBRARY PROGRAM

Thanks to the generosity of a friend, we have been able to offer free subscriptions to the Journal of Cycle Research to senior college libraries in this country and abroad.

Up to December 31, 1952 13 libraries said that they did not want it, 545 said that they did want it. All of the 545 who do want it have promised to list it, display it, and add it to their permanent collection.

Of the 545 who wanted it 471 were situated in this country and Canada and 74 abroad.

The total number of students in the colleges in this country and Canada, the libraries of which have asked for the *Journal of Cycle Research*, is 1,503,211. I have no way of knowing the number of students who attend the foreign colleges receiving the Journal.

Of the 471 in this country and Canada who are receiving it, we have the following break-down by size:

Students	Number of Institutions
5,000 and over	84
4,000—4,999	11
3,000—3,999	24
2,000—2,999	39
under 2,000	311

All the 545 libraries listed above have received Vol 1, Nos. 1, 2, 3, 4, and 5. We will continue to send them the Journal as long as the money holds out.

E.R.D.

FINANCIAL PROGRAM

It used to be possible to get money for scientific research from men of wealth. This day has passed, for the government has, for all practical purposes, confiscated wealth. Not-for-profit scientific organizations such as the Foundation for the Study of Cycles must, therefore, discover new sources of money.

Our solution to this problem was to put into effect a lay membership plan. The theory was that the lay members would contribute the money for research and enough more so that we could give them reports about what we found out.

In practice, it did not work out that way. It costs so much to obtain lay members, to publish the monthly reports, and to collect dues, that there is nothing left over for research! In fact, at the present time, the membership plan operates at a loss. Instead of the membership plan supporting the Foundation, the Foundation supports the membership plan!

If we had *enough* members things would be different. It does not cost too much to service *extra* members, once the first copy of the magazine has been printed. Twenty-five hundred dues paying members—if it did not cost too much to get them on our books—would provide enough money so that the membership plan would help support the Foundation, instead of the other way around.

I am told that it costs magazines the price of the first year's subscription to get a new subscriber. Our experience in getting new members has been about the same. However, we are beginning to learn how to cut this cost down. I will tell you more about the getting of new members in another report.

If the membership plan costs money, where does this money come from?

We have no endowment. However, the Foundation does do a little research for corporations and individuals. I charge $13.00 an hour for the time I spend on such research. I donate this $13.00 an hour to the Foundation. Enough money comes in from this source to cover the loss on the membership plan.

The Membership Plan

Dues and contributions from lay members and associates came to $16,224.32 for the calendar year 1952. This is an increase of $2,867.51 over the corresponding figure for 1951. There is no year, since we began the membership plan in 1943, that we have not shown growth.

E.R.D.

Letters

A Letter from Marvin W. Strate

Dear Mr. Dewey:

It was Samuel Johnson to whom James Boswell attributed the remark you ascribe to George Bernard Shaw and it went something like this if my memory of sophomore college English under Prof. Joseph Thomas at the University of Minnesota in 1929-1930 is not faulty as it probably is: "It is like a woman preaching. One is reminded of a dog walking upon his hind legs. One is not so much surprised to find it done badly as he is to find it done at all."

Have you looked into official police records as classified according to FBI standards to see if there are not cycles? There are seasonal peaks in incidence of various classes of crimes—is there a long term trend? (Danger is in classification, nomenclature, failure to report certain kinds of crimes; data are highly unreliable and probably not too valid but you may wish to pursue it in your third reincarnation.) Minneapolis revamped records system and developed the appearance of a sudden spurt in crime reporting which a public minded newspaper reporter did NOT score a beat on all others by reporting with headlines, and it was purely a function of changing the classification and categories etc.

Perhaps there would be something in fire department records—obviously a seasonal spurt—obviously cyclical trends resulting from newly introduced appliances' increasing hazards, etc.

Marvin W. Strate

Kansas City, Missouri

A Letter from Takoma Park, Maryland

Dear Mr. Dewey:

The March 1953 issue of "cycles" has reached me and I do not mind advising you almost by return mail that I have been extremely disappointed in the material.

I am curious to learn the reasoning you employ to support your conclusion that Hughey has done a competent job in his stock market analysis. (p. 72) As he states in his blurb on the back regarding the two new plates cycle theory must stand or fall on its performance.

I should like very much to receive the explanation of how the "forecast" line for 1951-52 took off in exactly the opposite direction of the direction of the actual market and the departure of actual from forecast being a mere 100 "points" apart can by any stretch of the imagination be considered "competent."

Your convention of charting and dating swings I consider to be very inadequate statistical presentation.

Very truly yours,

Takoma Park, Maryland

Reply to Takoma Park, Maryland

23 March 1953

Dear :

I am sorry you are disappointed in our monthly report.

Evidently you are under a serious misapprehension in regard to cycles. Many things act as if they were influenced by regularly recurring up and down forces but these forces do not account for *all* of the ups and downs. For example, as you know, there is a regular up and down seasonal temperature cycle calling for cold weather in the winter and hot weather in the summer but this cycle does not always govern. We sometimes have warm winters and cold summers and we often have cold days in the summer and warm days in the winter, too. The cycle accounts for only *part* of the behavior. But it is useful to know about the cycle of summer and winter even if it does not always govern.

Similarly, it is helpful to know about the regularly recurring cycles in prices, in business activity, in war, and in many other phenomena even though these cycles do not always govern.

The competence of a cycle analyst depends upon his ability to discover cycles that have been present in a series of figures. He is not to blame if actual behavior varies from the cyclic patterns any more than the climatologist is to blame if we have an especially warm February next year.

Specifically, in connection with the market, Mr. Hughey is not to blame if inflation of some other factor has prevented natural cyclic forces from expressing themselves either in the past or in the future. All he can do is to point out the cycles that have been present over the period under review.

Incidentally, in connection with Mr. Hughey's work you apparently overlooked my statement which said that the charts and so forth published in the March report constituted only 1/3 of his work. The other 2/3 of the work which importantly modifies his forecast line are being published in the reports for April and May.

Sincerely yours,

A Letter from John H. Nelson of RCA

Dear Mr. Dewey:

Your note to me of last week, has prompted me to send you the following "Progress Report" on my research dealing with Planetary Position Effects on Shortwave Radio. You are the Headquarters for Cycle Research and therefore, should be kept informed accordingly.

I have made more progress since last September 25th, than I made during the previous two years. September 25th is important because mother nature presented me with a new type of multiple configuration on that day. The new multiple was between Mercury, Venus, Earth and Mars all equally spaced at 60° which came out as follows:

1. Mercury - Earth 180°
2. Mercury - Venus 60°
3. Mercury - Mars 120°
4. Venus - Earth 120°
5. Venus - Mars 60°
6. Earth - Mars 60°

The day preceding the radio disturbance that came with this configuration, had similar characteristics to one back in 1949 which has always had me puzzled. The characteristic in each case was that on the day before the radio disturbance was recorded in Riverhead Logs for the day.

I checked on my back-date planetary diagrams and found that on that day, we also had four planets spaced exactly at 60° - Mercury and Venus at 180° with two slow planets between them spaced at 60° so it made a 180° - 60° - 60° arrangement just the same as September 25, 1952.

As you know from my past papers, I had only one type of multiple to work with which was, three *or more* planets inter-related at 90° multiples.

After September 25th, I immediately set to work to look for 60° multiples throughout my past planetary diagram records and was very elated to find that numerous severe disturbances that I had formerly attributed to single configurations of 180° were explained by this method.

In addition to the four planets equally spaced at 60°, I find also that shorter disturbances come with three planets equally spaced at 60°. In addition to this, I find three planets equally spaced at 45° will also be effective but to a lesser degree. It begins to look as though Harmonics are at the bottom of the whole thing. One set of harmonics beginning with 45° and another set beginning at 60°.

Following this I looked for Harmonics of 120° and found here too we had very severe radio disturbances when three planets came to a 120° spacing. This does not contradict my former statement that the 60° and 120° angles are quieting because I still find that a "single" 60° or "single" 120° does usually perform as stated, but when a set of *inter-related* 60° or 120° angles occur we get a radio disturbance.

I have made myself a simple "Harmonic Indicator" which makes it possible for me to tell at a glance just what the Harmonic relationships are between the various planets. This is simply a three inch transparent plastic protractor with all the 45° Harmonics marked off with a small red dot and the 60° Harmonics marked off with a blue dot, (use quick drying enamel).

By placing this over the Heleocentric Layout of the planets for any date, one can see at a glance just what planets are Harmonically related. The greater the number of Harmonics found in a short period of time, the more severe the radio disturbance will be. Most disturbance come with an inter-mixture of Red and Blue Harmonics.

Since I put three new multiples into operation, I have met with great success for my Long Range Forecasting and when I combine my daily Ionospheric Data with the Planet positions, I have no difficulty in maintaining an accuracy score averaging 85% per month. Incidently, I have just received my February score which is given as 91% accurate.

Six weeks in advance, I made a forecast for a Severe Disturbance for January 27 to 31, 1953, based on the first four element 60° multiple that has occurred since September and I got a perfect hit. To make it more interesting, there were NO SPOTS on the Sun during the disturbance.

I still have one major "Bug" in my work which I am trying to eliminate. Once in a while I find that a configuration that should theoretically produce a disturbance will "backfire" on me and instead of getting a degradation in signals I will get an improvement.

I pay little attention to single configurations in my work except in cases where two to three separate pairs of planets come to independent 0° arrangements in close time sequence. I consider these important and have found very good correlation. I find that the interrelationships of 45° - 60° - 90° - 120° multiples take care of over 80% of the radio disturbances.

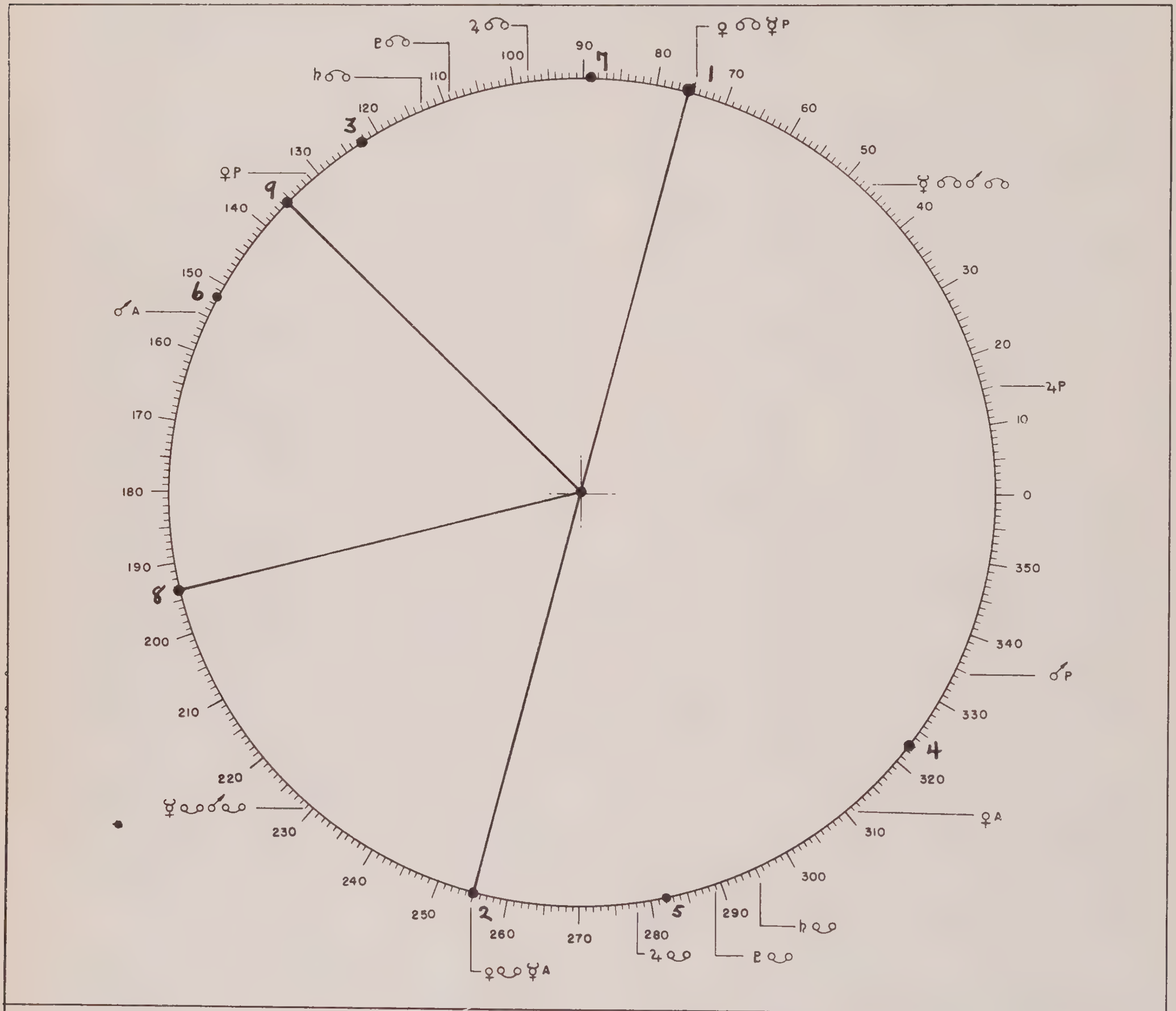
My forecasts, both daily and monthly, are distributed throughout the entire RCA communications system in New York and in addition go to all our radio communication centers in Europe, South America, and the Pacific area. They are also sent to the Pan American Airways, United Nations, Voice of America, Federal Communications Commission, U.S. Navy, Army. Air Force, Bureau of Standards, State Department and Civil Aeronautics Administration. Our London office, also passes copies of them to the British Broadcasting Corporation for their Short Wave Division.

Very truly yours,
John H. Nelson
Propagation Analyst

RCA Communications, Inc.
66 Broad Street, New York 4, New York

(See accompanying chart on the next page).

CHART ACCOMPANYING LETTER FROM JOHN H. NELSON



COMMENTS: MULTIPLE HARMONIC OF 60° DURING THE SEVERE RADIO DISTURBANCE OF JANUARY 24TH TO 28TH 1949

MANY SIMILAR CASES IN MY RECORDS

NELSON

COMMENTS:

1 MERCURY
2 VENUS
3 EARTH
4 MARS
5 JUPITER
6 SATURN
7 URANUS
8 NEPTUNE
9 PLUTO

A FOUNDATION REPRINT

CYCLICAL ANALYSIS

Industrial Common Stock Index

1854 - 1951

PREDIX

P. O. BOX 1245 DEPT. A
CORAL GABLES, FLA.

PLATE II

Copyright, July 1951, By Predix

EDITOR'S NOTES

In our March report we reprinted Mr. Veddar Hughey's Predix Plate I, reporting his cycle analysis of industrial common stocks.

In April we reprinted Predix Plate I-A which refined and amplified Plate I by combining additional cycles with the original synthesis.

Now we are reprinting Predix Plate II on pages *160* and *161* together with the tables on page *162*. This further refines the original work by adding the following cycles to the synthesis.

1.42 Years	74.09 Weeks
1.21 "	63.14 "
1.10 "	57.40 "
0.95 "	49.57 "
0.75 "	39.13 "
0.67 "	34.96 "
0.62 "	32.35 "
0.50 "	26.09 "
0.464 "	24.21 "
0.25 "	13.04 "

May I repeat at this point some comments in regard to this material which I made in the Directors Letter for March 1953? In that letter I said:

Now let us get some things straight about these projections, their strengths,— and their weaknesses.

A Competent Job

First of all, I have every reason to believe that Mr. Hughey has done an honest and a competent job. There is no secrecy about any of his work. His methods are fully revealed. Any competent person could duplicate his work and, presumably, obtain the same answers.

I will go further than that. I will say that in the present limited state of our knowledge about cycles, I do not think anyone could have done a better job, **for the time and money spent.** With more time and more money the job could doubtless be improved considerably.

Limitations

On the other hand, as Mr. Hughey would be the first to tell you, his work—like all cycle work until we know much more—is subject to many limitations. More particularly—

1. The data with which he had to work were not homogeneous.

2. Some of the cycles found by Hughey may have been cycles present in the original series purely by accident. Such cycles have no significance whatever and of course will not continue.

3. Hughey almost certainly has missed some of the cycles really present.

4. Hughey may not, in all instances, have determined the timing, shape, strength, and lengths of the component cycles with sufficient accuracy. It is particularly important that cycle length be determined with the greatest accuracy.

5. In some instances Hughey may have discovered cyclic behavior which is the result of cyclic causes closely related to each other in time span. Cycles caused in this way fade out and reappear upside down. Obviously such cycles included in a projection right side up will introduce an error when the "false" cycle fades out and reverses.

Some Long Cycles May Not Be Real

6. Hughey isolated a number of long cycles which have not repeated themselves often enough to justify any assumptions in regard to their reality. By including the long cycles he was able to make his synthesis fit the behavior from 1854 to date much more closely than it would otherwise have done. Fitting the over-all curve more closely helps you to compare the shorter moves more easily, and is thus justified.

7. Finally, even if the cycle analysis had been made by an omniscient Being, and could be counted upon to be correct in every particular, we would still not expect it to be more than a partial forecast of the future. Cyclic forces cannot possibly

account for all the ups and downs of the market. Sporadic accidental factors have their influence too. The most we can hope from a cycle analysis is that it will throw some light on the future and that it will be more right than wrong.

Forecast Has Worked

For all these reasons I do not feel that, until it has proved itself, Hughey's forecast is necessarily good enough for a prudent man to follow in the purchase and sale of stocks,—nor, incidentally, do I consider the forecast of anybody else good enough, either. However, I am much encouraged by the way in which the market in general has conformed for the last ten months to Hughey's projection made last April. If it continues to work, we can and should place more and more reliance upon it. Moreover in the meantime we can and should improve it.

The fact that Hughey's projection of stock market cycles made in 1951 and my projection of stock market cycles made in 1944 do not agree may bother you. Lest it bothers you I had best repeat some remarks on this subject made in my report for April 1952:

"I want to answer several requests asking me to explain why my stock market projection and Mr. Hughey's projection differ.

The Dewey vs. the Predix Projections

In referring to the Dewey vs. the Hughey projection, I have in mind, of course, a synthesis which I published in the June 1951 and September 1951 reports and a similar synthesis published by Mr. Vedder Hughey of Coral Gables, Florida, under the pseudonym of Predix.

One important difference between Hughey's projection and mine is the fact that Hughey's synthesis includes two important short-term cycles, both of which he diagrams as going down at the present time, whereas my synthesis contained no cycles less than 4.89 years in length.

Mr. Hughey's synthesis does not contradict mine; it supplements it.

Let me give you an analogy. Suppose I had made a reconnaissance survey of the height of the land above sea level, starting at New York and going westward. I might have discovered that for the first 50 miles the land averaged 50 feet above sea level, that for the next 50 miles it averaged 300 feet above sea level, and so on. This broad picture might be quite correct, but a more detailed survey would show wide variations from the averages. The hills would rise way above the average; the valleys would dip way beneath it.

This analogy applies to the surveys of market cycles made by Hughey and by me. Using only the longer cycles, my synthesis could not possibly be right for short-term moves. It was not designed to be.

A second difference between the two jobs is that mine was strictly preliminary and made for purposes of general reconnaissance only. My job took me only about three months to complete. Hughey, on the other hand, attempted to do a finished job. It took him about two year's time and, in addition, he had the aid of extensive IBM machine calculations.

I have explained time and again that my synthesis was merely a preliminary "mock-up" of some cycles which might be present in the stock market and that it was not to be relied upon as a forecast.

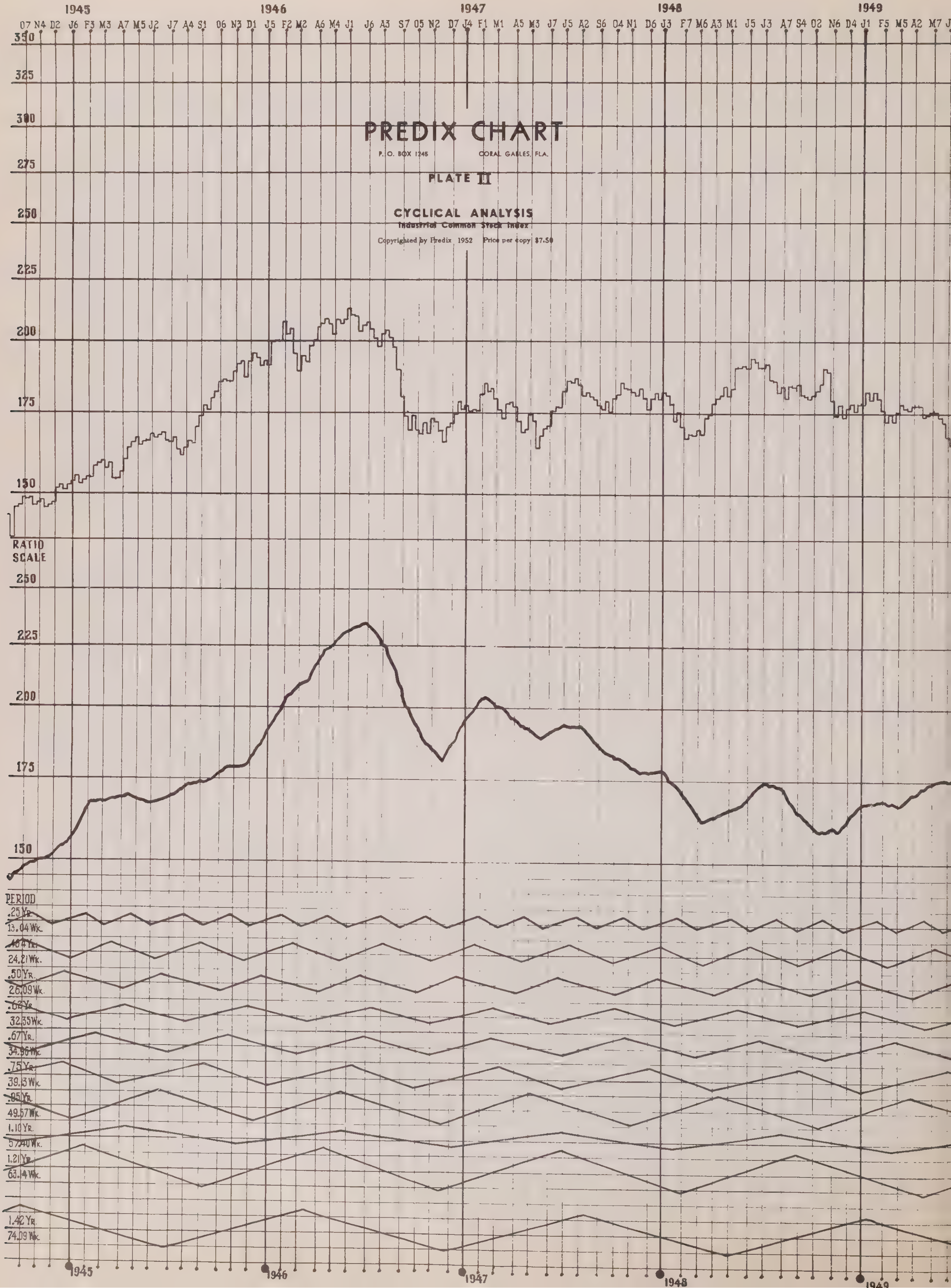
A third difference between Mr. Hughey's work and mine is that in his synthesis he used 19 cycles, whereas I used but 10.

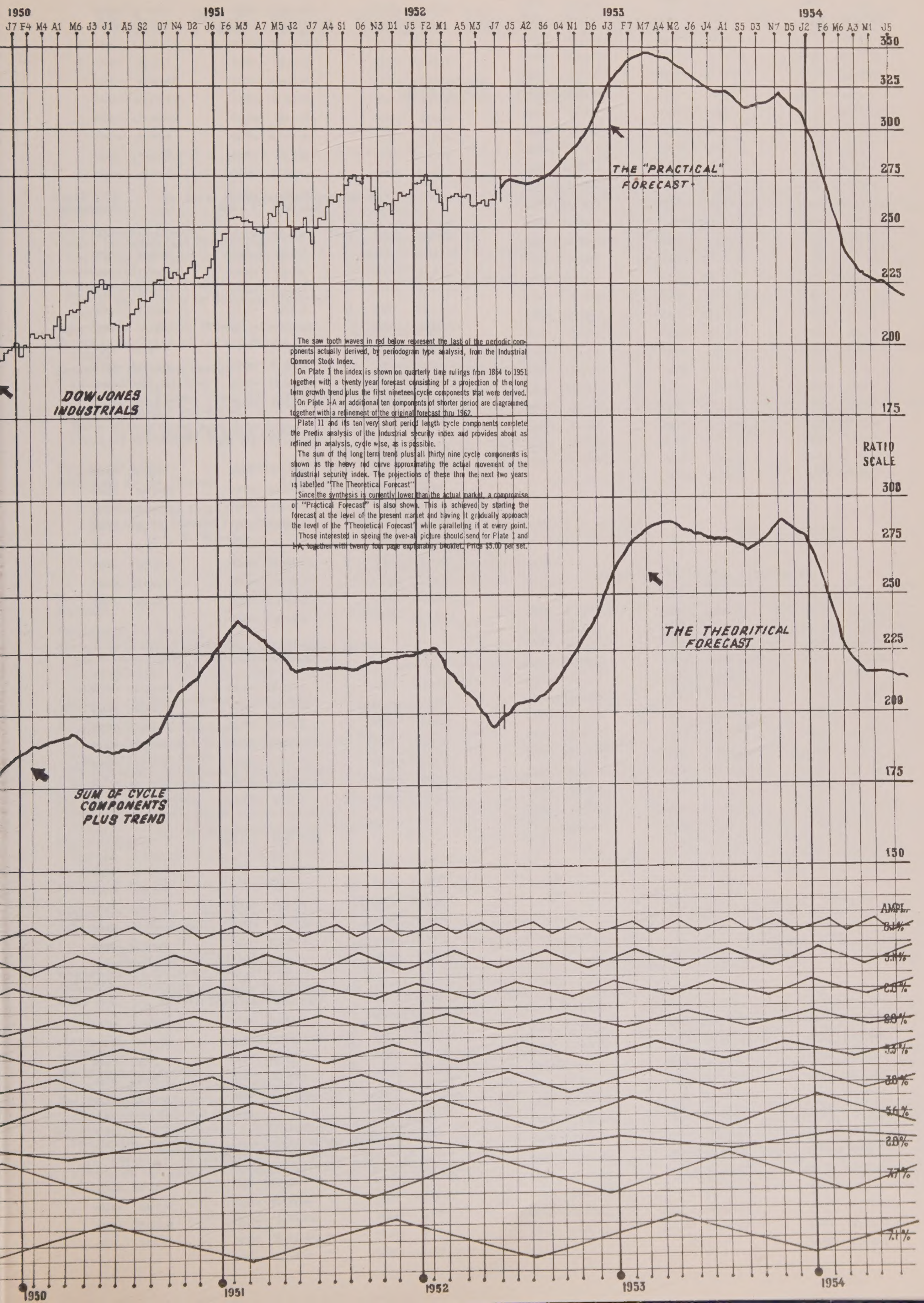
This inclusion of other cycles is bound to make a difference in the projection and would, of course, make Hughey's projection better than mine if the additional cycles are real and continue.

Hughey's synthesis should be better than mine but, as I have said before, neither projection is good enough for a prudent man to follow.

PREDIX Forecast Improved

The above quotation was written after the publication of the first of the three charts referred to above. Since that time the two additional charts, incorporating the results of Mr. Hughey's research in respect to medium and short-term cycles, have been added to the synthesis. These provide a better fit to past behavior and, everybody hopes, will provide a better forecast as well.


PREDIX CHART
P. O. BOX 1245 CORAL GABLES, FLA.
PLATE II
CYCLICAL ANALYSIS
Industrial Common Stock Index
Copyrighted by Predix 1952 Price per copy $7.50
1945
1946
1947
1948
1949
07 N4 D2 J6 F3 M3 A7 M5 J2 J7 A4 S1 06 N3 D1 J5 F2 M2 A6 M4 J1 J6 A3 S7 05 N2 D7 J4 F1 M1 A5 M3 J7 J5 A2 S6 04 N1 D6 J3 F7 M6 A3 M1 J5 J3 A7 S4 02 N6 D4 J1 F5 M5 A2 M7 J
350
325
300
275
250
225
200
175
150
RATIO SCALE
250
225
200
175
150
PERIOD
.25 Yr.
13.04 Wk.
.464 Yr.
24.21 Wk.
.50 Yr.
26.09 Wk.
.62 Yr.
32.35 Wk.
.67 Yr.
34.96 Wk.
.75 Yr.
39.13 Wk.
.95 Yr.
49.57 Wk.
1.10 Yr.
57.40 Wk.
1.21 Yr.
63.14 Wk.
1.42 Yr.
74.09 Wk.
1945
1946
1947
1948
1949



The saw tooth waves in red below represent the last of the periodic components actually derived, by periodogram type analysis, from the Industrial Common Stock Index.

On Plate I the index is shown on quarterly time rulings from 1854 to 1951 together with a twenty year forecast consisting of a projection of the long term growth trend plus the first nineteen cycle components that were derived.

On Plate 1-A an additional ten components of shorter period are diagrammed together with a refinement of the original forecast thru 1962.

Plate 11 and its ten very short period length cycle components complete the Predix analysis of the industrial security index and provides about as refined an analysis, cycle wise, as is possible.

The sum of the long term trend plus all thirty nine cycle components is shown as the heavy red curve approximating the actual movement of the industrial security index. The projections of these thru the next two years is labelled "The Theoretical Forecast"

Since the synthesis is currently lower than the actual market, a compromise or "Practical Forecast" is also shown. This is achieved by starting the forecast at the level of the present market and having it gradually approach the level of the "Theoretical Forecast" while paralleling it at every point.

Those interested in seeing the over-all picture should send for Plate 1 and 1-A, together with twenty four page explanatory booklet. Price $5.00 per set.

TOP AND BOTTOM TURNING POINTS OF THE .250 YEAR WAVE ± 1.05%

9-9-44	-0045	10-28-44	+0045	12-2-44	-0045
2-3-45	+0045	3-10-45	-0045	4-28-45	+0045
6-2-45	-0045	8-4-45	+0045	9-8-45	-0045
10-28-45	+0045	12-1-45	-0045	2-2-46	+0045
3-9-46	-0045	4-27-46	+0045	6-1-46	-0045
8-3-46	+0045	9-7-46	-0045	10-26-46	+0045
11-30-46	-0045	2-1-47	+0045	3-8-47	-0045
4-26-47	+0045	5-31-47	-0045	8-2-47	+0045
9-6-47	-0045	10-25-47	+0045	11-29-47	-0045
1-31-48	+0045	3-6-48	-0045	4-24-48	+0045
5-29-48	-0045	7-31-48	+0045	9-4-48	-0045
10-23-48	+0045	11-27-48	-0045	1-29-49	+0045
3-5-49	-0045	4-23-49	+0045	5-28-49	-0045
7-30-49	+0045	9-3-49	-0045	10-22-49	+0045
11-27-49	-0045	1-28-50	+0045	3-4-50	-0045
4-22-50	+0045	5-27-50	-0045	7-29-50	+0045
9-2-50	-0045	10-28-50	+0045	12-2-50	-0045
2-3-51	+0045	3-10-51	-0045	4-28-51	+0045
6-2-51	-0045	8-4-51	+0045	9-8-51	-0045
10-27-51	+0045	12-1-51	-0045	2-2-52	+0045
3-8-52	-0045	4-26-52	+0045	5-31-52	-0045
8-2-52	+0045	9-6-52	-0045	10-25-52	+0045
11-29-52	-0045	1-31-53	+0045	3-7-53	-0045
4-25-53	+0045	5-30-53	-0045	8-1-53	+0045
9-5-53	-0045	10-24-53	+0045	12-5-53	-0045
1-30-54	+0045	3-6-54	-0045	4-24-54	+0045
5-29-54	-0045	7-31-54	+0045		

TOP AND BOTTOM TURNING POINTS OF THE .62 YEAR WAVE ± 1.40%

9-9-44	+0060	12-30-44	-0060	4-21-45	+0060
8-11-45	-0060	12-1-45	+0060	3-23-46	-0060
2-23-46	+0065	5-18-46	-0065	8-10-46	+0065
11-2-46	-0065	1-25-47	+0065	4-19-47	-0065
7-19-47	+0065	10-4-47	-0065	1-3-48	+0065
3-20-48	-0065	6-12-48	+0065	9-11-48	-0065
11-27-48	+0065	2-19-49	-0065	5-14-49	+0065
8-13-49	-0065	11-5-49	+0065	1-28-50	-0065
4-22-50	+0065	7-15-50	-0065	10-14-50	+0065
1-13-51	-0065	3-31-51	+0065	6-30-51	-0065
9-15-51	+0065	12-8-51	-0065	3-8-52	+0065
5-24-52	-0065	8-23-52	+0065	11-8-52	-0065
2-7-53	+0065	5-2-53	-0065	7-25-53	+0065
10-17-53	-0065	1-9-54	+0065	4-3-54	-0065
7-3-54	+0065				

TOP AND BOTTOM TURNING POINTS OF THE .500 YEAR WAVE ± 1.40%

10-14-44	-0060	12-30-44	+0060	4-10-45	-0060
6-30-45	+0060	10-13-45	-0060	12-29-45	+0060
4-13-46	-0060	6-29-46	+0060	10-12-46	-0060
12-21-46	+0060	4-12-47	-0060	6-28-47	+0060
10-11-47	-0060	12-27-47	+0060	4-10-48	-0060
6-26-48	+0060	9-11-48	-0060	12-25-48	+0060
4-9-49	-0060	6-25-49	+0060	10-8-49	-0060
12-24-49	+0060	4-8-50	-0060	6-24-50	+0060
10-14-50	-0060	12-30-50	+0060	4-14-51	-0060
6-30-51	+0060	10-13-51	-0060	12-29-51	+0060
4-12-52	-0060	6-28-51	+0060	10-11-51	-0060
12-27-51	+0060	4-11-52	-0060	6-27-52	+0060
10-10-52	-0060	12-26-52	+0060	4-10-52	-0060
6-26-52	+0060				

TOP AND BOTTOM TURNING POINTS OF THE .62 YEAR WAVE ± 1.40%

9-9-44	+0060	12-30-44	-0060	4-21-45	+0060
8-11-45	-0060	12-1-45	+0060	3-23-46	-0060
7-20-46	+0060	11-2-46	-0060	3-1-47	+0060
6-14-47	-0060	10-11-47	+0060	1-24-48	-0060
5-22-48	+0060	9-4-48	-0060	1-8-49	+0060
4-23-49	-0060	8-20-49	+0060	12-3-49	-0060
4-1-50	+0060	7-22-50	-0060	11-18-50	+0060
3-3-51	-0060	7-7-51	+0060	10-20-51	-0060
2-2-52	+0060	5-31-52	-0060	9-27-52	+0060
1-17-53	-0060	5-9-53	+0060	8-29-53	-0060
12-26-53	+0060	4-10-54	-0060	8-7-54	+0060

TOP AND BOTTOM TURNING POINTS OF THE .67 YEAR WAVE ± 1.65%

10-28-44	-0070	3-3-45	+0070	7-7-45	-0070
10-28-45	+0070	3-2-46	-0070	7-6-46	+0070
11-2-46	-0070	3-1-47	+0070	7-5-47	-0070
11-1-47	+0070	3-6-48	-0070	7-3-48	+0070
10-2-48	-0070	3-5-49	+0070	7-2-49	-0070
10-29-49	+0070	3-4-50	-0070	7-8-50	+0070
11-11-50	-0070	3-10-51	+0070	7-14-51	-0070
11-10-51	+0070	3-15-52	-0070	7-12-52	+0070
11-8-52	-0070	3-14-53	+0070	7-18-53	-0070
11-7-53	+0070	3-13-54	-0070	7-17-54	+0070

TOP AND BOTTOM TURNING POINTS OF THE .75 YEAR WAVE ± 1.90%

12-23-44	+0080	4-7-45	-0080	9-15-45	+0080
1-5-46	-0080	6-15-46	+0080	10-5-46	-0080
3-15-47	+0080	7-5-47	-0080	12-13-47	+0080
4-3-48	-0080	9-11-48	+0080	1-1-49	-0080
6-11-49	+0080	10-1-49	-0080	3-11-50	+0080
7-1-50	-0080	12-16-50	+0080	4-7-51	-0080
9-15-51	+0080	1-5-52	-0080	6-14-52	+0080
10-4-52	-0080	3-14-53	+0080	7-4-53	-0080
12-12-53	+0080	4-3-54	-0080		

TOP AND BOTTOM TURNING POINTS OF THE .95 YEAR WAVE ± 2.80%

1-6-45	-0120	6-23-45	+0120	12-15-45	-0120
5-25-46	+0120	11-23-46	-0120	5-10-46	+0120
11-8-47	-0120	4-17-48	+0120	10-16-48	-0120
4-2-49	+0120	10-1-49	-0120	3-11-50	+0120
9-16-50	-0120	3-3-51	+0120	9-1-51	-0120
2-9-52	+0120	8-9-52	-0120	1-24-53	+0120
7-25-53	-0120	1-2-54	+0120	7-3-54	-0120

TOP AND BOTTOM TURNING POINTS OF THE 1.10 YEAR WAVE ± 1.40%

10-7-44	-0060	4-21-45	+0060	11-10-45	-0060
5-25-46	+0060	12-14-46	-0060	7-5-47	+0060
1-24-48	-0060	8-7-48	+0060	2-26-49	-0060
9-10-49	+0060	4-1-50	-0060	10-21-50	+0060
5-12-51	-0060	11-24-51	+0060	6-14-52	-0060
1-3-53	+0060	7-25-53	-0060	2-6-54	+0060

TOP AND BOTTOM TURNING POINTS OF THE 1.21 YEAR WAVE ± 3.85%

2-3-45	+0160	9-15-45	-0160	4-20-46	+0160
11-23-46	-0160	7-5-47	+0160	2-7-48	-0160
9-11-48	+0160	4-23-49	-0160	12-3-49	+0160
7-15-50	-0160	2-24-51	+0160	9-29-51	-0160
5-3-52	+0160	12-13-52	-0160	7-25-53	+0160
2-27-54	-0160				

TOP AND BOTTOM TURNING POINTS OF THE 1.42 YEAR WAVE ± 3.55%

10-14-44	+0150	6-30-45	-0150	3-16-46	+0150
11-30-46	-0150	8-16-47	+0150	5-1-48	-0150
1-1-49	+0150	10-1-49	-0150	6-17-50	+0150
3-3-51	-0150	11-17-51	+0150	8-2-52	-0150
4-18-53	+0150	1-2-54	-0150		

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